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CLIMATIC ATLAS OF THE OUTER CONTINENTAL SHELF WATERS AND COASTAL REGIONS OF ALASKA.

VOLUME II. BERING SEA.

(14) AEIDC-B-77-VOL-2

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NCC

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Acknowledgements

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We would like to give special thanks to the AEIDC graphics staff who worked many hours preparing maps and graphic presentations and organizing the material for printing.

The maps, graphs, and tables in the second section are the result of efforts by many people (aided by modern data processing equipment) at NOAA's National Climatic Center (NCC) in Asheville, NC. Special acknowledgement is given to members of the Computer Support Branch, who performed the voluminous data processing, to Joe E. Elms and Albert W.Y. Chen of the Applied Climatology Branch for their editorial evaluation of the analyses, and to Dr. Harold L. Crutcher and M. Lawrence Nicodemus of the Science Advisory Staff for the statistical presentation of return periods for maximum sustained winds for selected coastal stations.

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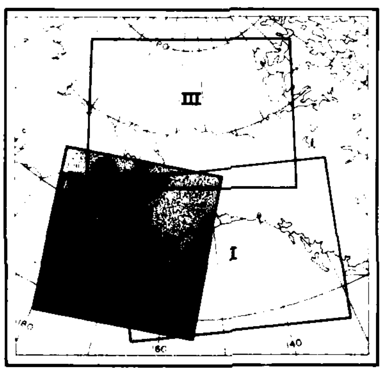
This was supported (under AEIDC contract no. 03-5-022-56 with NOAA) by the Bureau of Land Management through interagency agreement with the National Oceanic and Atmospheric Administration, under which a multiyear program responding to needs of petroleum development of the Alaskan outer continental shelf is managed by the Outer Continental Shelf Environmental Assessment Program (OCSEAP) office.

Abstract

This project attempts to establish the present knowledge of climatological conditions in three Alaskan marine and near coastal areas that are important to resource development of the outer continental shelf—The Gulf of Alaska (Vol. I), The Bering Sea (Vol. II), and The Chukchi and Beaufort Seas (Vol. III) as shown on the map below.

The maps, graphs, and tables in the atlas present a detailed climatic profile of the marine and coastal regions of Alaska. Statistics detail means, extremes, and percent frequency of occurrence of threshold values for these elements: wind, visibility, present weather, sea level pressure, temperature, clouds, and waves and such supplemental information as storm surges, tides, sea ice, surface currents, bathymetry, detailed weather, and aviation weather. Data came from 600,000 surface marine observations and 2 million observations for 49 coastal land stations and provide the best possible climatological picture of the outer continental shelf waters and coastal regions of Alaska.



Introduction

The nature of man's offshore activities depends to a large extent on weather conditions. Knowledge of these conditions can help insure efficient and safe operations. Extreme weather conditions that may be encountered in a given location largely determine the design, construction, and operation of permanent platforms and structures in the ocean as well as onshore support activities. Weather information also aids in assessing the onshore impact of offshore activities.

This atlas is the result of a joint effort by Arctic Environmental Information and Data Center (AEIDC), University of Alaska, and the National Climatic Center/National Oceanic Atmospheric Administration (NCC/NOAA) to present descriptive climatology and data analyses of surface marine and atmospheric parameters for those waters and coastal regions of the Alaskan outer continental shelf important to resource development. It is designed to serve as a climatological reference in the assessment of potential impact by oil and gas exploration and development and of leasing and operating regulations and monitoring programs that will permit resource development and insure environmental protection.

The evaluation is in the form of a climatic atlas for each of three marine and coastal areas: The Gulf of Alaska (Vol. I), The Bering Sea (Vol. II), and The Chukchi and Beaufort Seas (Vol. III).

The first section in each volume contains information on such hazards as storm surges, superstructure icing, hypothermia, and wind chill; extremes data on winds, temperature, and precipitation; and planning information on surface currents, bathymetry, sea ice, and aviation weather. The second section presents a detailed climatic profile in the form of isopleth analyses, graphs, and tables.

Selected Topics in Marine and Coastal Climatology

James L. Wise
Harold W. Searby

Storm Surges

Whenever an intense storm crosses or approaches a coastline, some portion of the shore will experience an increase in sea level and another will experience a decrease. Storm surges are the difference—positive or negative—between observed sea level and the sea level that would have occurred without a storm. Storm surges are usually estimated by subtracting normal astronomical tide from the observed tide. Negative surges can affect shipping by grounding ships in harbors or shallow shipping lanes during low tide. However, the combination of a positive storm surge and high tide often damages beaches and man-made installations far beyond the normal tidelands level.

Several processes may combine to cause storm surges (Pore and Barreness 1975). These include the direct wind effect, the atmospheric pressure effect, the transport of water by waves and swell, the effect of the earth's rotation, the rainfall effect, and the effects of coastline configuration and bathymetric conditions.

Direct Wind Effect—The rise of water from the wind consists of a component caused by the onshore wind and one caused by wind oblique to the shore. An onshore wind will cause water to move in the direction of the wind due to the drag exerted on the water by the movement of air. Its effects are directly proportional to the wind stress and inversely proportional to water depth. The effect of wind oblique to the shore comes from a wind-generated current which is parallel to the shore and has a higher level to the right of the flow.

Atmospheric Pressure Effect—The rise of the surface of the ocean in an area of low atmospheric pressure has been called the inverted barometer effect. This amounts to a rise in sea level of about 13.16 inches for an atmospheric pressure fall of 1 inch of mercury, or 30 millibars pressure change for each 0.305-meter (1-foot) change in sea level.

Transport of Water by Waves and Swell—The maximum contribution of waves and swell to the storm surge may occur at times other than the peak intensity of the storm. Swell generated over open water some distance from shore may arrive at the shoreline at a different time than the storm itself. A long fetch allows more time for waves to form and move as swell along with the winds of the storm, thus producing a higher storm surge overall.

Effect of the Earth's Rotation—The earth's rotation accelerates any current in the Northern Hemisphere to the right. This deflection force, called the Coriolis effect, depends on the speed of the current and the latitude. Winds parallel to a coast will generate a current in the same direction. The resulting acceleration to the right creates water motion that can increase water level.

Rainfall Effect—Hurricanes and extratropical storms usually bring heavy precipitation to large geographic areas. The resulting runoff can increase sea level near the mouths of tidal estuaries.

Effect of Coastline Configuration and Bathymetric Conditions—Bottom topography near shore is an important determinant of the amplitude of a storm surge. Gently sloping offshore bottom topography on the continental shelf promotes higher storm surges than a steep continental shelf.

The configuration of the coast also affects the resulting storm surge. Wave energy will diverge at coastal indentations such as coves and converge at coastal headlands or points, so stronger surges occur where land juts out into the sea.

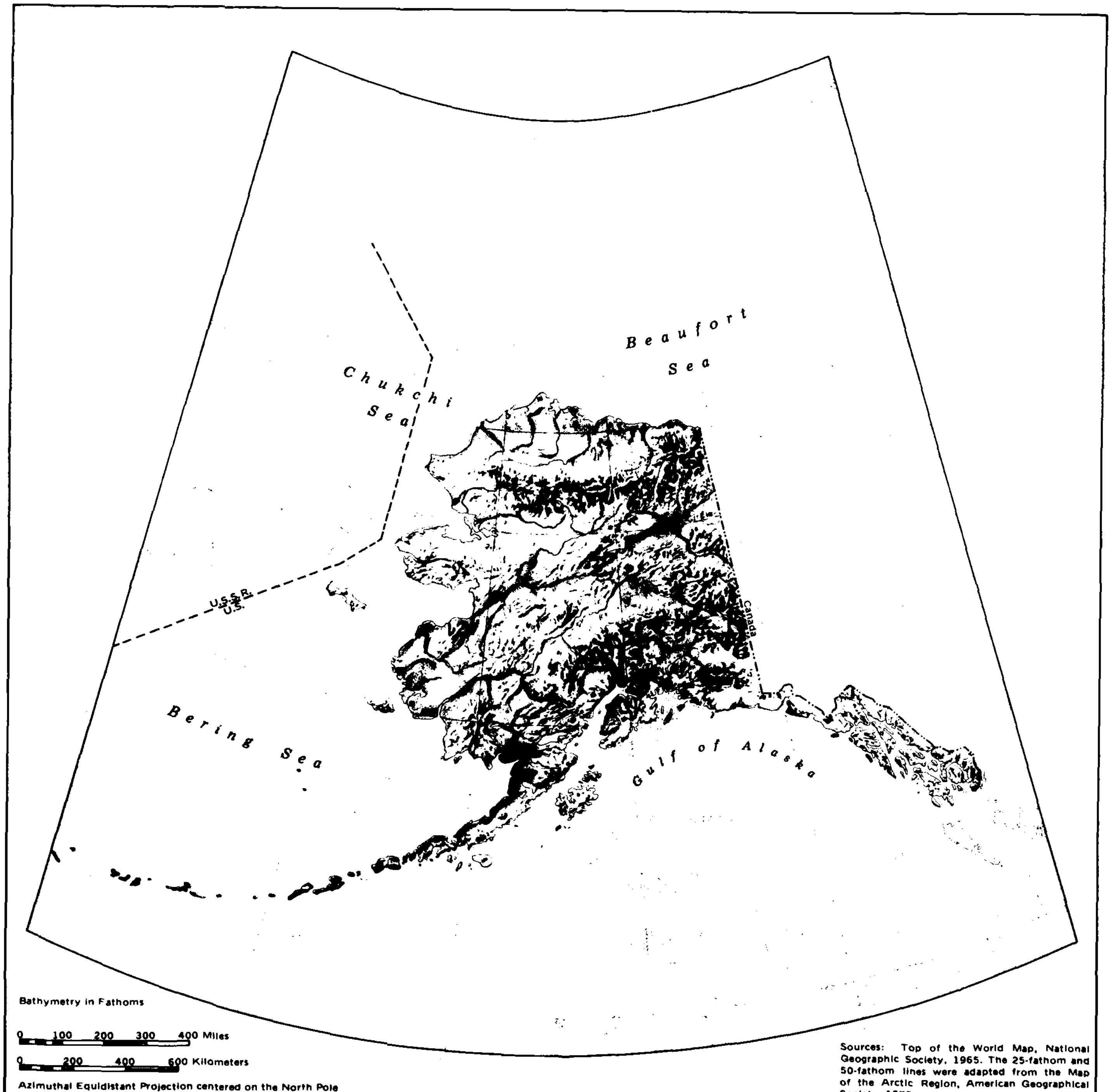
Tidal gauges probably do not record the highest water levels of major storms because tide gauges are usually spaced so far apart that the highest levels most likely occur between the gauges.

The shape of the Bering Sea floor west of 165 degrees west, see Figure 1, is not conducive to the development of storm surges. Storm surges are rare along the north coast of the Alaskan Peninsula east of this longitude because the fetch necessary to generate high seas is seldom sufficient to develop a significant storm surge. From the east end of Bristol Bay northward, the coast is subject to storm surges only when little or no sea and shore ice are present, varying from about the end of April to mid-December in the south to mid-June to mid-November in the north. During the remainder of the year the sea is normally more than half covered with ice and shore ice is present.

The graph and map set No. 18, low pressure center movement roses and storm track maps for May through December, shows a primary or secondary storm track in the south Bering for six of the eight months. October is the month with most frequent storms. Five of six storms which were documented to have caused high damage came from the southwest (Figure 2); only one came from the northwest, causing flooding in the Nome and Unalakleet areas.

The most recent and well-known major storm occurred in the Nome area during the period of November 11-13, 1974. The storm was estimated to be a once-in-30-years occurrence. Damage to public and private property was estimated at 12 million dollars. Flooding extended from Unalakleet on the south to Deering on the north shore of the Seward Peninsula. Total rise of water was estimated at 7.6 meters (25 feet) where the normal tide range is 1.2 meters (4 feet) Some parts of Nome were under 3.1 meters (10 feet) of water.

This storm was actually a series of three storms from the 8th to the 12th of November (No. 5 in Figure 2). The first became nearly stationary just south of the Chukotski Peninsula on the 10th and was followed immediately by two developing waves on a front on the 11th and 12th with almost no break in between. This allowed a long fetch to be set up in the south Bering which generated the high seas which eventually struck the coast. The first flooding occurred on the 11th and continued on through the 12th and early 13th. Maximum sustained winds of 38 knots and gusts to 69 or 70 knots were recorded at the height of the storm. The October 2-4, 1960 storm at Unalakleet, which caused damage estimated at 100 thousand dollars, had combined sea and swell of 6.2 meters (20 feet), sustained winds of 40 knots, and maximum gusts to 60 knots.



Sources: Top of the World Map, National Geographic Society, 1965. The 25-fathom and 50-fathom lines were adapted from the Map of the Arctic Region, American Geographical Society, 1975.

Figure 1 Bathymetry and topography

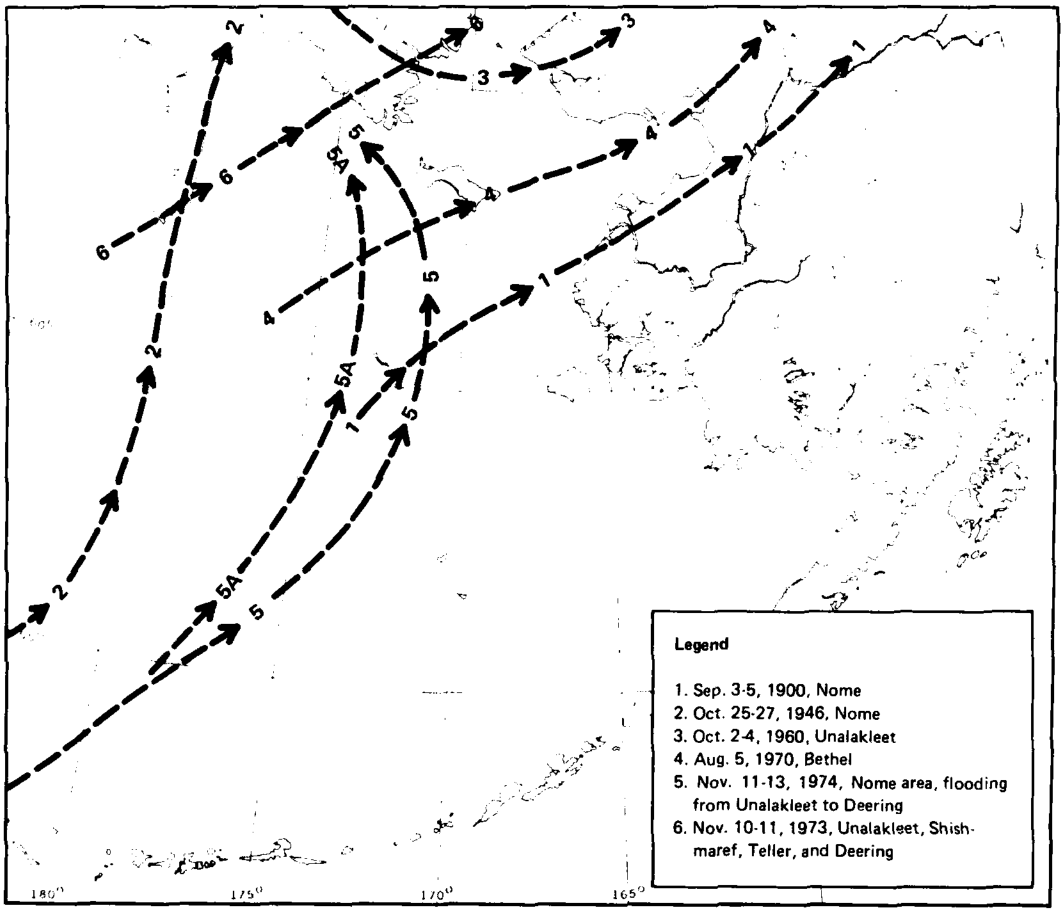


Figure 2 **Storm surge occurences**

Legend

Surface Currents

Surface currents information is from the *U.S. Navy Marine Climatic Atlas of the World Vol II, North Pacific*, which is currently being revised. Mean speeds and directions of surface currents are derived from random ships' observations, specific scientific cruise studies, and theoretical considerations. More recent studies have differed with these depictions somewhat, especially in the Gulf of Alaska and the Bering Strait in summer. Royer (1975) and Ingraham (1976) found evidence of currents flowing east and south along the north and east coasts of the gulf with a weak closed anticyclonic (clockwise) circulation in the northeast Gulf of Alaska. The strength of this circulation varies from year to year in the weak summer flows. When this closed circulation develops, the northward flowing Alaska Current is displaced to the west. Coachman and Aagaard (1966) found a weak sporadic current flowing southward along the west coast of the Bering Strait. They also noted that strength of flow through the strait varied by a factor of five within a week.

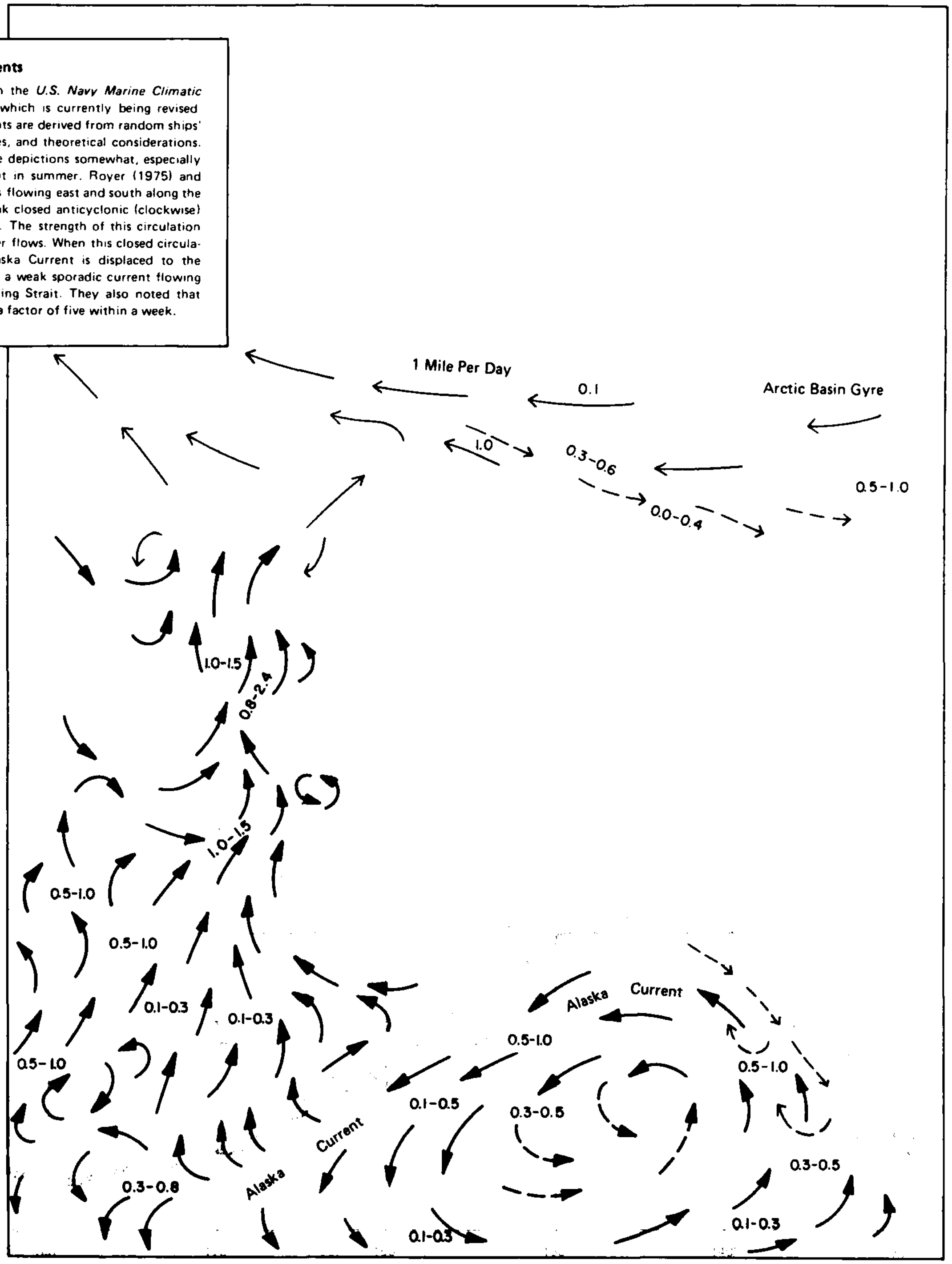


Figure 3 Summer sea surface currents

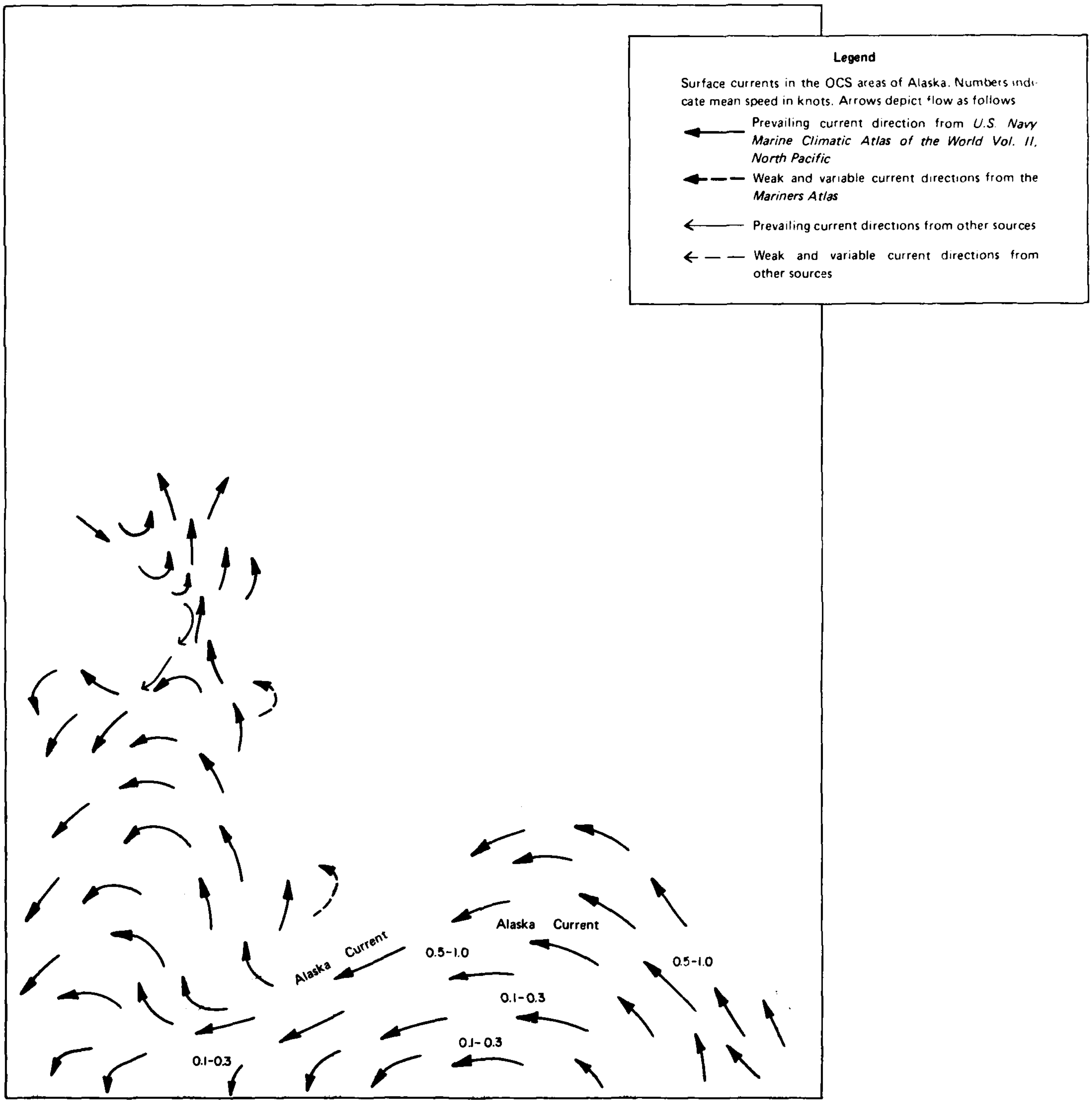


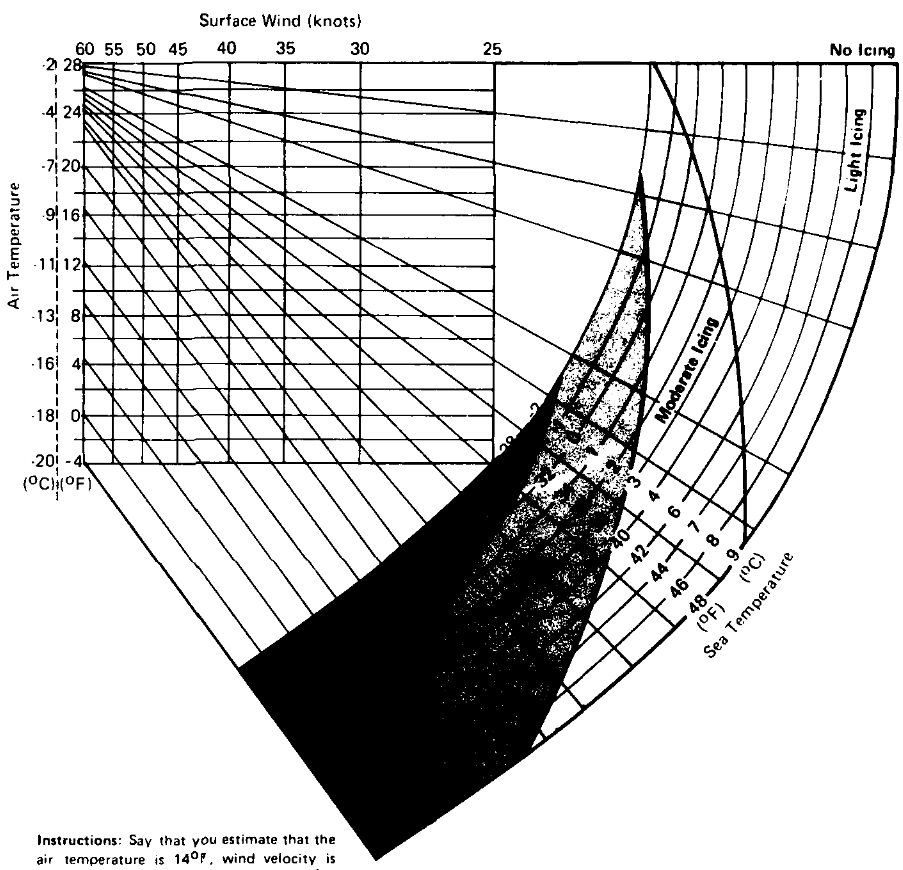
Figure 4 Winter sea surface currents

Superstructure Icing

Ice accretion is a complex process that depends on sea conditions, atmospheric conditions, and the ship's size and behavior. Icing can be caused by heavy sea spray, freezing rain, or fog. It can mean no more than slippery decks on large merchant vessels since they often pass quickly through icing conditions and experience less wave wash in rough seas because of their high freeboard. At other times, even large vessels may experience problems. Smaller ships with relatively lower freeboard, such as fishing vessels, small merchant ships, and coast guard cutters, are susceptible to wave wash in rough seas. Icing can greatly increase a vessel's weight and elevate the center of gravity making it top heavy. Ice may increase the sail area and heeling moment due to wind action, and trim can be changed because of nonuniform ice distribution. Icing also hampers steerability and lowers ship speed. Similar, potentially dangerous stresses can occur on oil-drilling and other stationary platforms.

Freezing spray is the most common and dangerous form of icing. It can occur when the air temperature falls below the freezing temperature of sea water (usually about -2°C) and when sea surface temperatures are below about 5°C. If the air temperature falls below about -18°C, wind-induced spray may freeze before striking the ship and not adhere. The lower the temperature and the stronger the wind, the more rapidly ice accumulates. Freezing spray may deposit thick layers of ice on rigging or on deck areas, rapidly increasing the vessel's weight, which can cause it to sink.

The National Weather Service's regional offices at Anchorage and Fairbanks routinely issue structural icing forecasts as part of their marine forecasting program. Figure 5 is a nomograph used by the NWS in forecasting spray icing. Data from sets Nos. 5, 14, and 15 can be used with this nomograph to estimate the severity of spray icing for any month of the year. The nomograph does not apply when sea ice reduces the amount of wind-generated spray.



Instructions: Say that you estimate that the air temperature is 14°F, wind velocity is 30 knots, and the sea temperature is 32°F. Enter the nomograph on the 14°F line. Follow this line to the 30 knot wind velocity line. From the intersection of the two lines, follow the diagonal line to the appropriate water temperature line. At the intersection read off the icing category—in this case, heavy icing.

The icing categories used by the NWS are

Category	Accumulation
Light	0.4" to 1.4" in 24 hours
Moderate	1.4" to 2.6" in 24 hours
Heavy	2.6" to 5.7" in 24 hours
Very Heavy	5.7" + in 24 hours

Adapted from: Comiskey, A. 1976. Vessel Icing-Know When to Expect It. *Alaska Seas and Coasts*, University of Alaska, Alaska Sea Grant Program. 4(5), pp. 6-7.

Figure 5
Nomograph for forecasting spray ice accumulation

Legend

Diurnal Range	
Max diurnal	Min diurnal
Max tide	Min tide

Diurnal range is the average difference in height between mean higher high water and mean lower low water in feet on a single day.

Max diurnal and Min diurnal are the maximum and minimum differences in feet respectively between the higher high water and lower low water that are predicted to occur during the year.

Max tide is the highest tide predicted to occur at the location in feet above mean sea level.

Min tide is the lowest tide predicted to occur at the location in feet above mean sea level. A negative number indicates a level below mean sea level.

Prepared by AEIDC from Tide Tables, High and Low Water Predictions 1974, West Coast of North and South America, NOS/NOAA, 1973.

Station	Diurnal range	Max diurnal	Min diurnal	Max tide	Min tide
1 Sweeper Cove	3.7	6.7	0.1	5.5	-1.7
2 Martin Harbor	3.2	5.8	0.1	4.8	-1.5
3 Inanudak Bay	3.7	5.9	0.0	4.7	-1.5
4 Chernofski Harbor	3.8	5.9	0.0	4.9	-1.3
5 Koshega Bay	4.0	6.0	0.0	5.1	-1.1
6 Dutch Harbor	3.7	5.9	0.0	4.9	-1.4
7 Port Moller	10.8	16.5	5.7	12.9	-3.9
8 Port Heiden	12.3	18.3	1.5	14.3	-4.3
9 Egegik River, Entrance	18.2	24.7	6.1	21.2	-3.4
10 Naknek River, Entrance	22.6	30.0	9.8	26.0	-4.4
11 Naknek Air Base	3.2	3.3	2.2	3.0	-0.3
12 Kvichak	16.5	20.4	8.6	19.2	-1.5
13 Nushagak	19.5	26.8	6.6	23.1	-4.1
14 Goodnews Bay	8.9	10.3	1.0	11.3	-1.0
15 Kuskokwak Creek	12.2	17.3	0.8	16.8	-0.8
16 Bethel	4.0	4.5	0.7	4.3	-0.2
17 Village Cove	3.2	5.1	0.0	4.1	-1.2
18 St. Matthew Island	2.1	3.4	0.0	2.7	-0.8
19 Northeast Cape	2.4	3.0	1.1	2.8	-0.3
20 Moghoweyik River	1.7	2.7	0.2	2.1	-0.6
21 Cape Romanzof	6.8	10.8	0.9	8.6	-2.2
22 Kwikluak Pass	2.3	2.4	0.6	2.1	-0.3
23 Apoonmouth	4.0	6.5	0.2	5.3	-0.6
24 St. Michael	3.9	5.8	0.1	5.2	-0.6
25 Carolyn Island	1.8	2.7	0.0	2.4	-0.3
26 Nome	1.6	2.4	0.0	2.0	-0.5

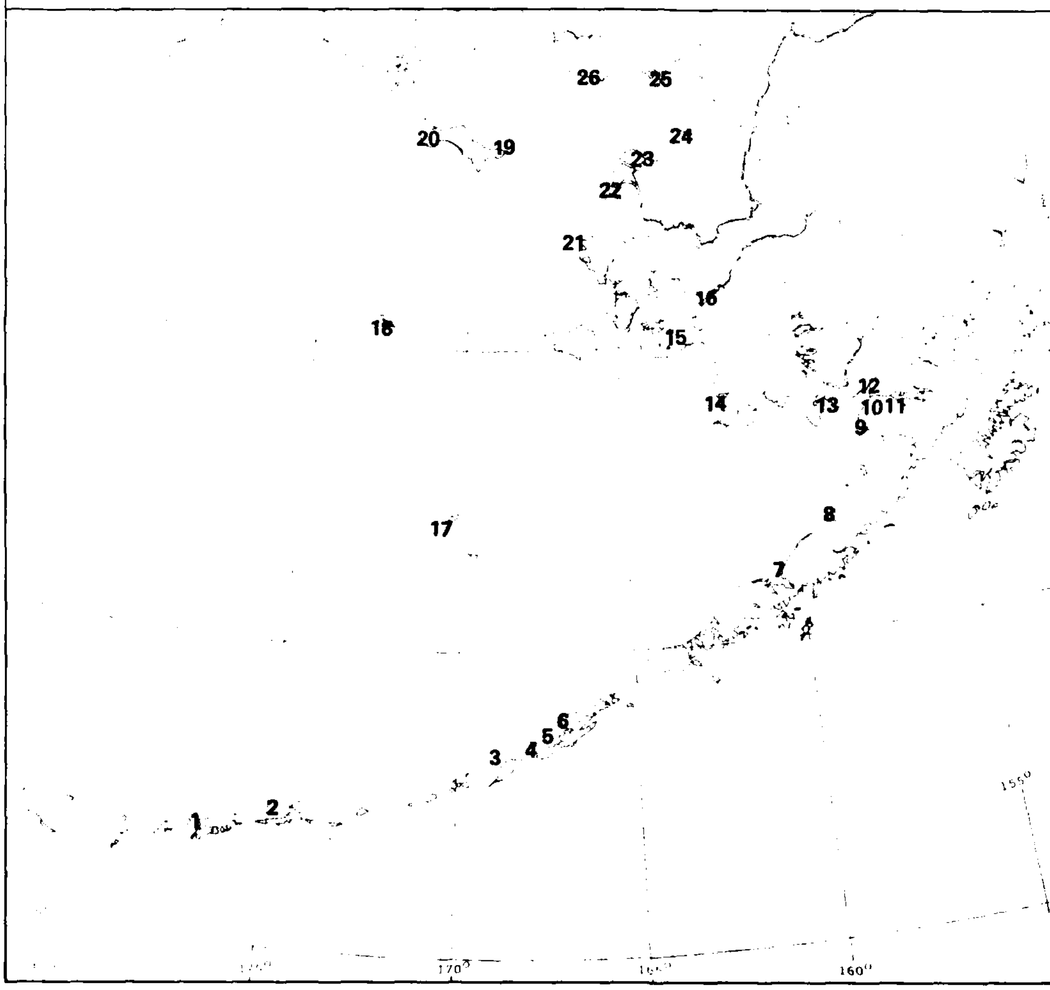


Figure 6 Tide data

Semimonthly Positions and Ranges of Pack Ice Edge

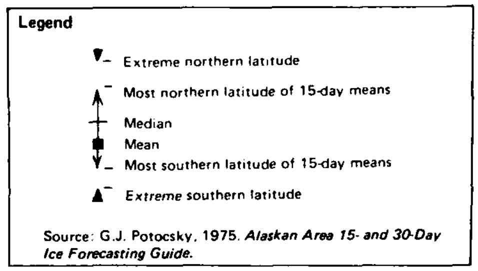
The mean, median, and ranges of the 15-day means and extreme southern and northern positions of the pack ice were computed for each semi-monthly period from 1954 through 1970. Data were provided by aerial, ship, and satellite observations of the pack edge contained in Naval Oceanographic Office annual reports that show ice conditions by six-day periods. The mean ice edge was computed from the three six-day periods in each semi-monthly period (the 13th to 18th days are included in both semi-monthly computations). An ice concentration of one-eighth (1 okta) or more defines the pack edge. Total ice coverage is eight-eighths or eight oktas. By international agreement the okta system is used to describe the extent of ice cover.

The southernmost position of the 15-day mean pack edge in the Bering Sea is in mid-March. It begins to move north in early May and by mid to late June has moved through the Bering Strait. Mean and median values indicate that the pack edge does not retreat northward along each meridian at a uniform rate. Generally, the greatest 15-day mean meridianal range of the ice edge is during mid-June. This large range may be related to adjacent landmass configuration. Differences between mean and median values during retreat of the ice edge are generally less than 15 nautical miles (28 km) during the latter half of May. Similar conditions exist during the southward advance of the pack edge. Differences between mean and median values during advance of the pack edge are also generally less than 15 nautical miles (28 km); however, the greatest difference is 110 nautical miles (209 km) in December. The greatest rate of movement for both retreat and advance occurs between the northern Bering and the southern Chukchi Sea during freezeup and breakup periods. More rapid recession of the ice edge during May and June results from disintergration closely related to the location and extent of large water openings within the main body of the pack ice. Two such openings occur in Kotzebue and Norton Sounds. These are shown on the May, June, and November maps.

Sea Ice Distribution

During winter and spring, ice covers nearly the entire northeast half of the Bering Sea. The southern portion of the covered area of the Bering Sea contains thin first-year ice 12 to 28 inches (30-71 cm) thick near the end of its growth cycle, whereas the northern portion and immediate coastal areas north of 62 degrees north latitude attain medium first-year growth of from 28 to 48 inches (71 to 122 cm). The Bering Strait is covered throughout the growth cycle with predominantly thin and medium first-year ice.

Normally, the Bering Sea is essentially free of sea ice by early summer. Ice concentrations in areas north of the Bering Strait continue to decrease as the summer progresses. Beginning in October the pack edge reverses direction and begins to move southward. It reaches its maximum southward position during late March, probably more because of wind drift than freezing.



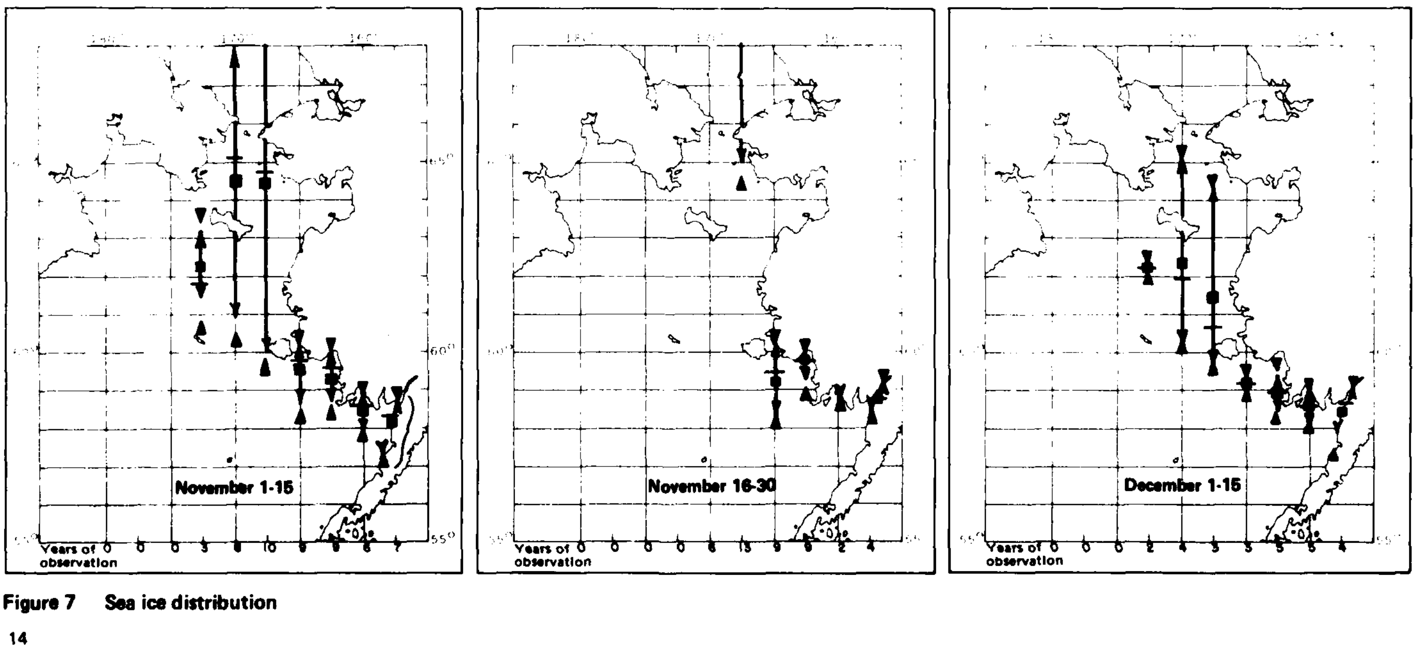


Figure 7 Sea ice distribution

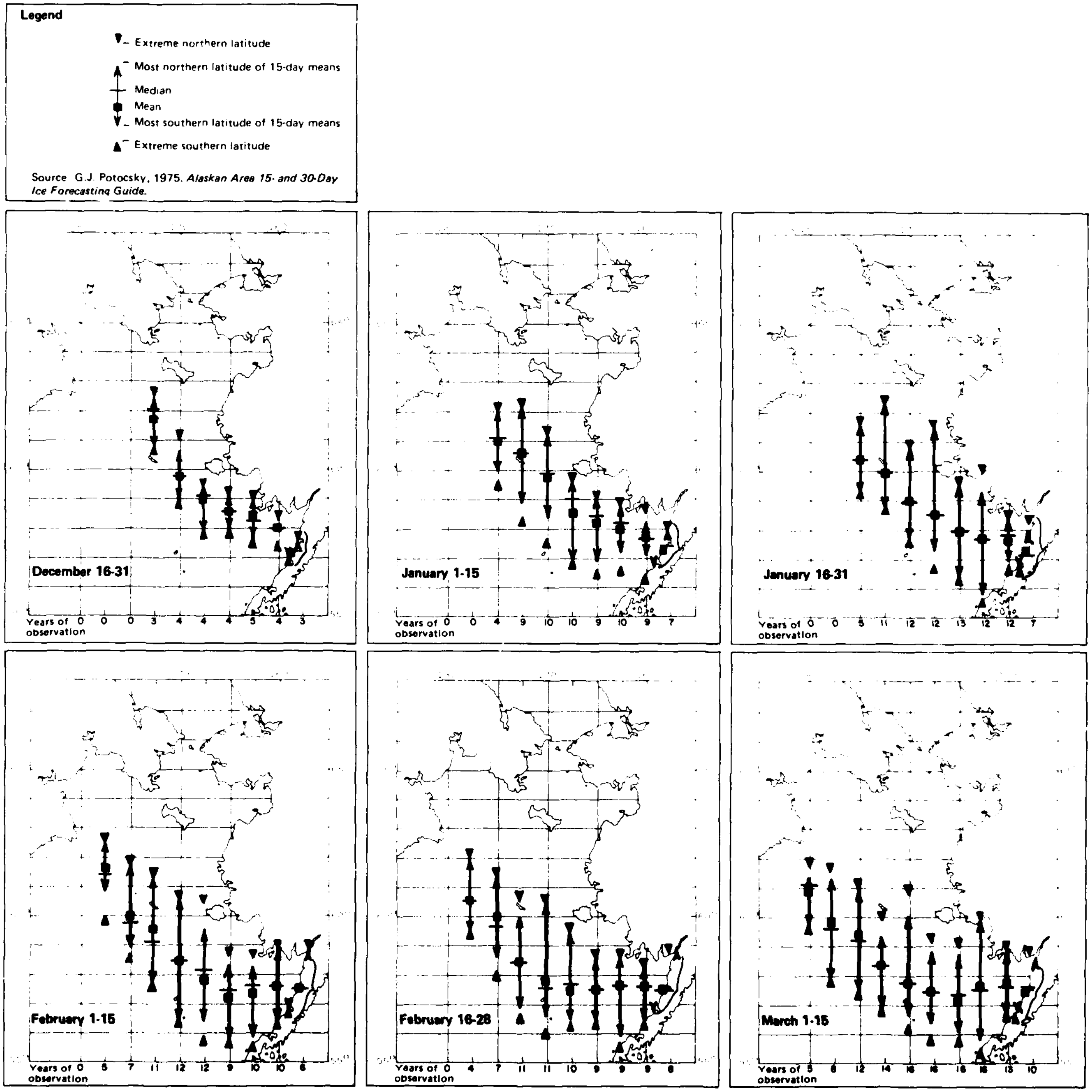


Figure 7 Sea ice distribution (cont.)

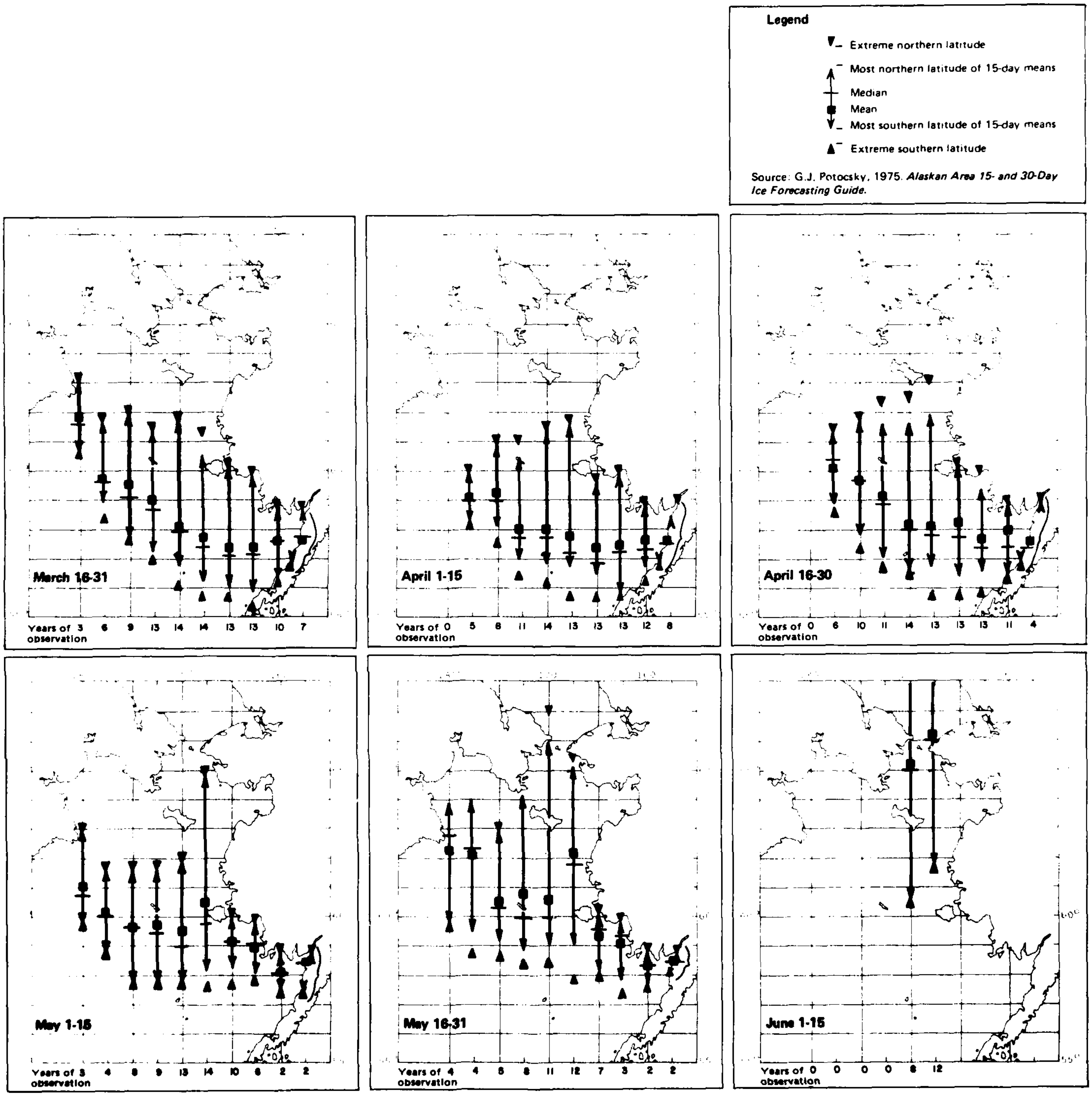
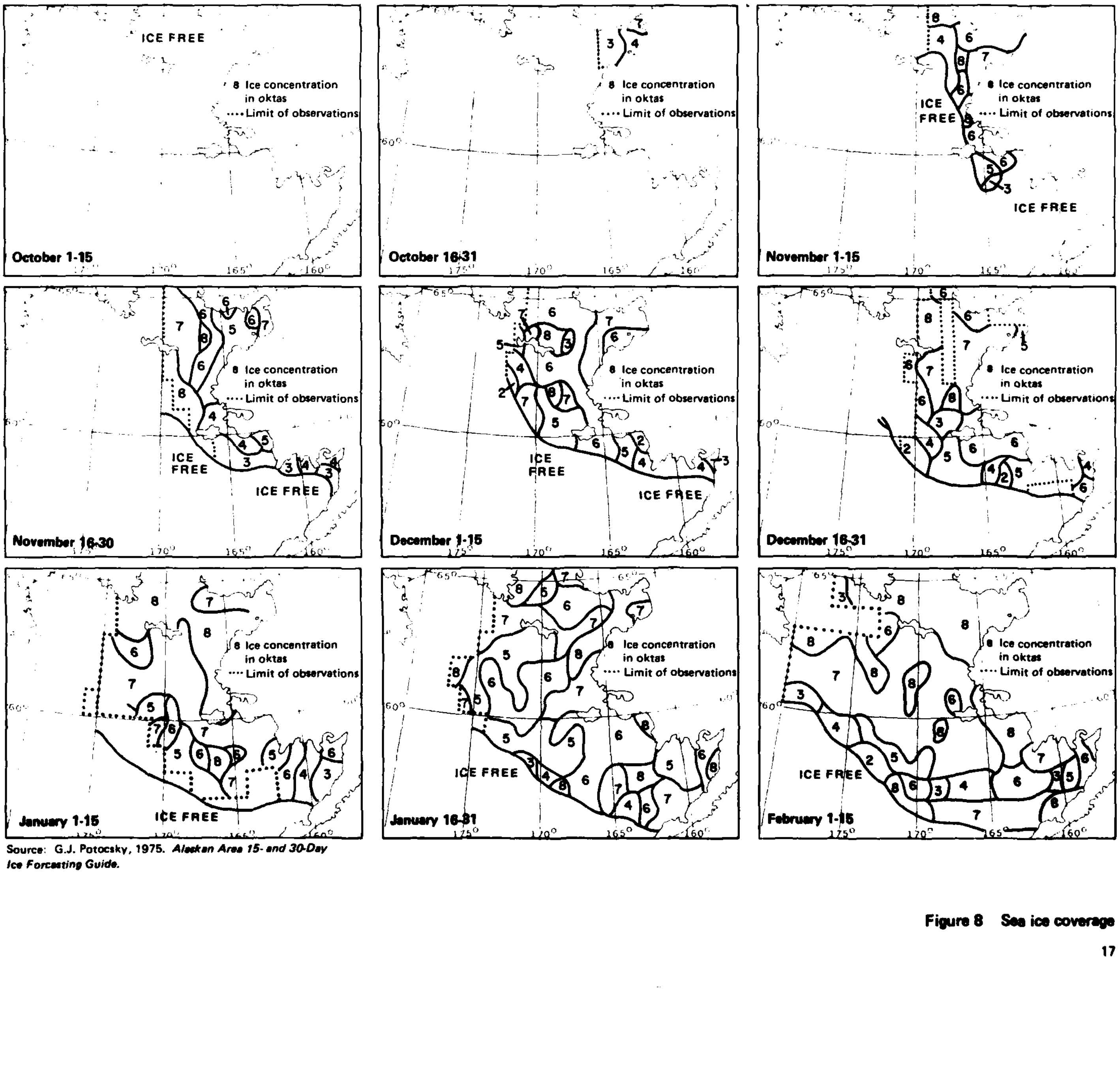


Figure 7 Sea ice distribution (cont.)



Source: G.J. Potocsky, 1975. *Alaskan Area 15- and 30-Day Ice Forcasting Guide.*

Figure 8 Sea ice coverage

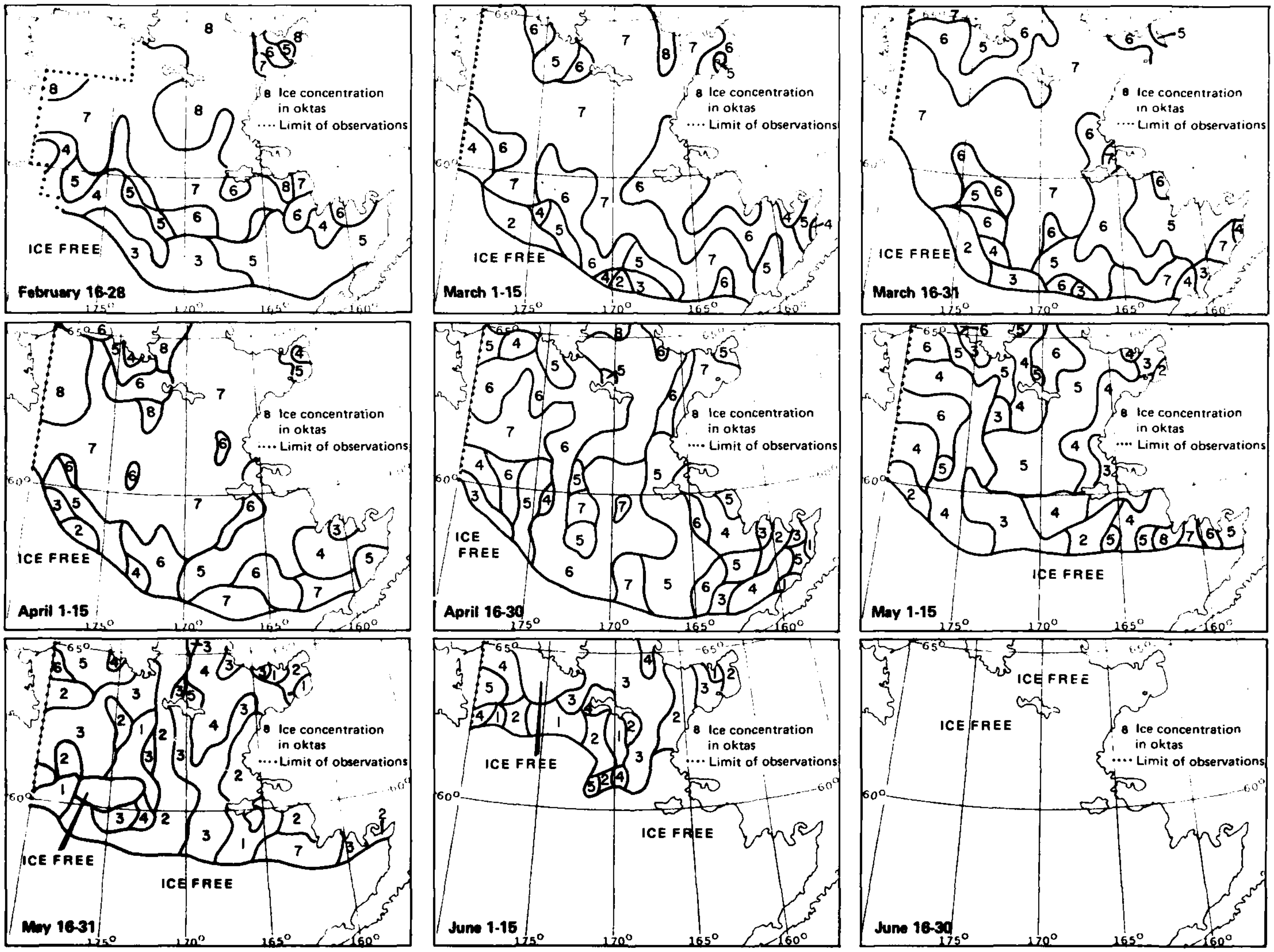


Figure 8 Sea ice coverage (cont.)

Immersion Hypothermia

Immersion hypothermia is the loss of heat when a body is immersed in water. With few exceptions, humans die if their normal rectal temperature of approximately 37.6°C drops below 25.9°C. Cardiac arrest is the most common direct cause of death. Except in tropical waters warmer than 20° to 25°C, the main threat to life during prolonged immersion is cold or cold and drowning combined.

Cold lowers body temperature, which in turn slows the heart beat, lowers the rate of metabolism, and increases the amount of carbon dioxide in the blood. Resulting impaired mental capacity is a major factor in death by hypothermia. Numerous reports from shipwrecks and accidents in cold water indicate that people can become confused and even delirious, further decreasing their chances of survival.

The length of time that a human survives in water depends on the water surface temperature and, to a lesser extent, on the person's behavior. Figure 9 shows the approximate human survival time in the sea. Body type can cause deviations. For example, thin people become hypothermic more rapidly than fat people. Extremely fat people may survive almost indefinitely in water near 0°C if they are warmly clothed.

The cooling rate can be slowed by the person's behavior and insulated gear. Wilson (1976) closely monitored more than 500 immersions in the waters around Victoria B.C. with temperatures ranging from 4° to 16°C. Using the information obtained from his research, Wilson reasoned that if the critical heat loss areas could be protected, survival time would increase. The Heat Escape Lessening Posture (HELP) was developed for those in the water alone and the Huddle for small groups. Both require a life preserver. HELP involves holding the upper arms firmly against the sides of the chest, keeping the thighs together, and raising the knees to protect the groin area. In the Huddle, people face each other and keep their bodies as close together as possible. These positions improve survival time in 9°C water to four hours, approximately two times that of a swimmer and one and one-half times that of a person in the passive position.

Figure 9
Survival time versus water temperature

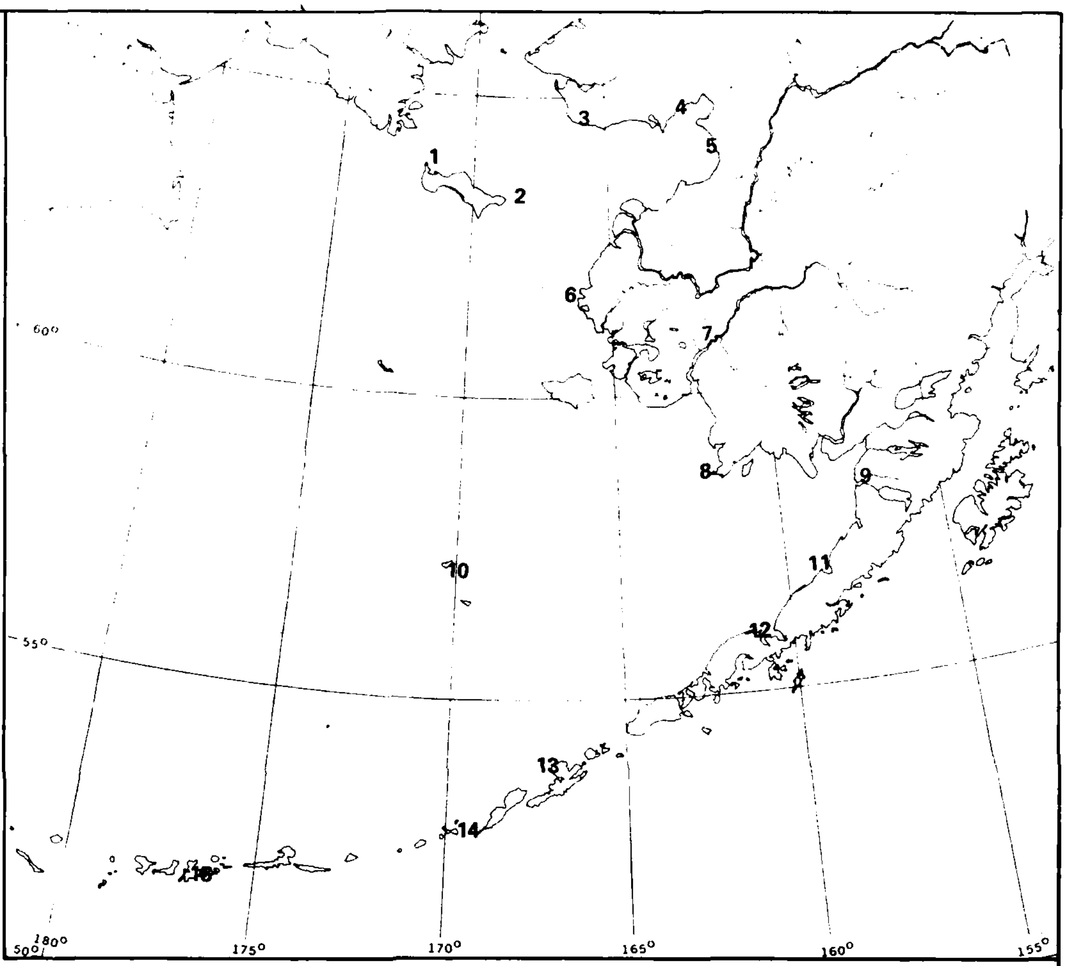
Water Temperature	Exhaustion or Unconsciousness	Expected time of Survival
0°C	15 min	15–45 min
0°– 5°C	15–30 min	30–90 min
5°–10°C	30–60 min	1– 3 hrs
10°–15°C	1– 2 hrs	1– 6 hrs
15°–20°C	2– 7 hrs	2–40 hrs
20°–25°C	3–12 hrs	3–indefinite hrs
25°C	Indefinite	Indefinite

Sensible Climate Elements

Extremes data were gathered through a search of all available records deemed reliable, some dating back to the 1800s. Weather records of the U.S. Army Signal Corps and, more recently, those of the National Weather Service and the weather services of the U.S. Air Force and Navy were included, as were data tabulations prepared by the National Climatic Center.

Figure 10 presents annual means and extremes of temperatures, precipitation, snowfall, and wind for island and coastal locations for which data are available. These data are useful in planning for average as well as least favorable conditions. Figure 11 (Precipitation intensities) data indicate the percent frequency of occurrence of precipitation amounts based on daily observations for the wettest month, the driest month, and annually. These data are useful in the design of storm drainage systems, culverts, and shore-based support facilities. Figures 12 and 13 (Snowfall and snow depth) statistics show the month with the greatest snowfall and snow depth and annual statistics. Percentages shown in the annual column are averaged over 12 months. If, as in some cases, several months of the year have no snowfall or snow depth, this condition is indicated by showing the actual number of months with snow. Figure 14 (Type of precipitation) shows the percent frequency of occurrence of precipitation by type, based on hourly observations with no regard to intensity. These data are useful in planning surface transportation systems, construction schedules, and recreational activities. Figures 15 and 16 (Visibility obstructions and Ceiling and visibility data) are especially useful for pilots and others planning flying activity. AEIDC and NCC can provide more detailed monthly and daily statistics.

Maps in set No. 17 (Wave height thresholds and hazardous sea conditions) show maximum wave heights. These were taken from tabulated reports of maximum wave heights supplied by the National Climatic Center and were supplemented by observations from various volumes of the *Mariners' Weather Log*, a publication of NOAA's Environmental Data Service.



Station	Mean Annual Maximum	Mean Annual Minimum	Highest	Lowest	Total Precipitation Average Annual	Precip. Greatest Month	Precip. Greatest Day	Snowfall Average Annual	Snowfall Greatest Month	Snowfall Greatest Day	Snow depth Annual Maximum on Ground	Prevailing Direction	Average Annual Speed	Fastest Direction	Fastest Speed
1 Gambell	-2.2	-6.6	18.3	-34.4	15.83	5.86	1.82	79.7	55.1	14.1	51	NE	15.5	M	
2 Northeast Cape	-1.1	-6.2	20.0	-48.3	16.06	7.04	1.91	68.6	32.8	6.9	62	N	11.2	SE	94
3 Nome	0.3	-7.4	30.0	-43.3	16.44	7.82	2.38	53.7	25.9	8.4	74	N	9.6	E	60
4 Moses Point	-0.2	-7.8	30.6	-45.0	18.93	M	2.06	81.7	39.9	20.6	75	NNE	12.4	SW	50
5 Unalakleet	0.8	-7.0	30.6	45.6	14.16	8.07	1.53	40.5	37.3	14.0	42	ENE	10.5	E	60
6 Cape Romanzof	0.7	-4.2	26.1	-31.7	25.38	10.50	2.71	71.1	68.7	12.5	116	NE	11.7	NE	55
7 Bethel	2.3	5.9	30.0	-43.3	15.84	12.37	2.40	49.1	57.4	18.7	45	NNE	9.8	SSE	54
8 Cape Newenham	2.8	-1.7	23.9	-33.3	37.24	10.27	3.13	81.2	38.7	13.1		N	9.8	E	60
9 King Salmon	5.0	-3.7	31.1	-41.1	19.75	7.30	2.00	44.6	16.2	9.5	31	N	9.1	E	68
10 St. Paul	3.6	-0.8	17.8	-32.2	24.54	9.32	1.93	59.2	55.8	13.8	33	N	14.9	N	71
11 Port Heiden	5.5	-1.7	30.6	-31.7	14.63	5.92	3.00	62.3	37.7	18.0	14	ESE	12.9	E	65
12 Port Moller	5.5	-2.9	23.3	-22.8	43.51	M	5.00	92.1	M	10.4	36	S	8.7	S	55
13 Driftwood Bay	6.3	-0.7	24.4	-16.1	20.55	7.63	3.08	70.2	40.1	30.0	25	NW	8.3	WSW	55
14 Nikolski	5.0	0.8	15.6	-11.7	23.41	M	2.50	33.5	M	10.4	12	NW	13.8	NNW	60
15 Adak	6.9	2.4	23.9	-16.1	68.08	16.10	4.85	98.1	58.9	17.0	30	SW	14.2	SW	84

Example		Element	Key
17.6 | 3.6	22.2 | -14.4	Temperature (°C)	Mean Annual Maximum | Mean Annual Minimum; Highest | Lowest
114.30	34.87 | 7.59	Total Precipitation (inches) (Rain and Snow)	Average Annual; Greatest Month | Greatest Day
58.5	46.9 | 14.2	Snowfall (inches)	Average Annual; Greatest Month | Greatest Day
40		Snow depth (inches)	Annual Maximum on Ground
SSE 9.3	SSE 52	Surface Wind (knots)	Prevailing Direction Average Annual Speed; Fastest Direction and Speed

Where the mean annual temperature (average of the mean annual maximum and minimum) is less than zero some type of permafrost will probably be present.

These data can be used for long-range planning and design criteria. More detailed information can be obtained from the National Climatic Center and the Arctic Environmental Information and Data Center in Anchorage.

M = information is missing

Prepared from Environmental Data Service data.

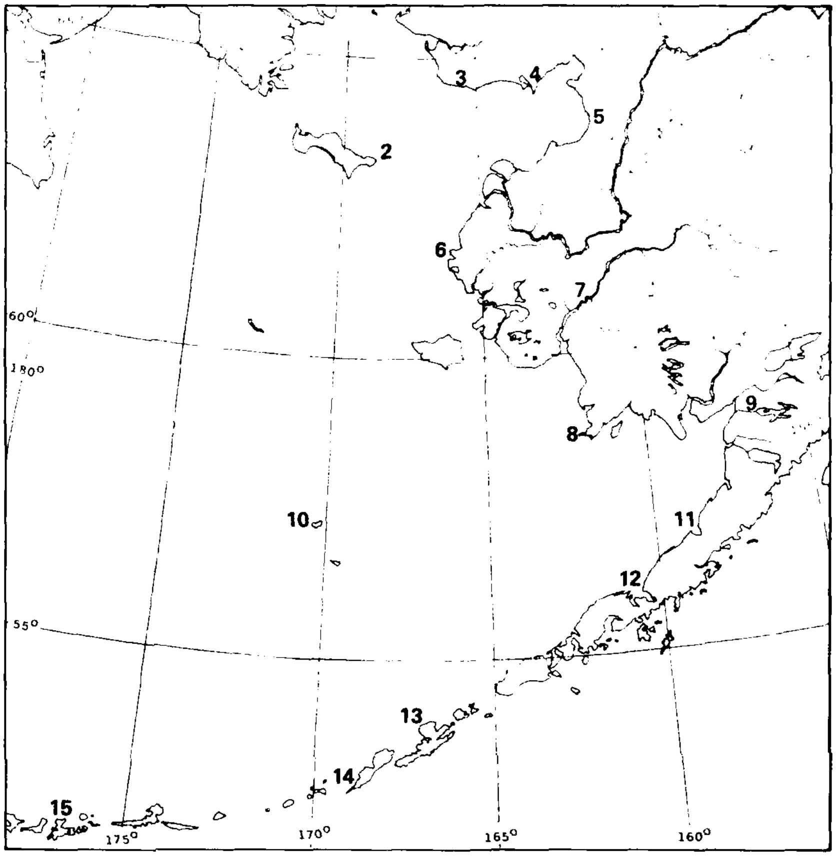
Figure 10 Climatic means and extremes

Legend

Percent frequency of occurrence of precipitation is based on daily observations. Total is the percent of days with measurable precipitation; a trace is not included.

* less than 0.05%

Prepared from USAF Air Weather Service data, various dates.



2 Northeast Cape

Inches	Least Apr	Most Sep	Annual
Trace	48.0	27.5	35.3
0.01–0.10	10.7	26.2	22.7
0.11–0.25	2.0	11.7	6.7
0.26–0.50	1.3	8.3	2.9
0.51–1.00	0.0	6.2	1.7
1.01–2.50	0.0	0.4	0.3
2.51–5.00	0.0	1.2	0.1
5.01–10.00	0.0	0.0	*
TOTAL	14.0	54.0	34.4

3 Nome

Inches	Least Feb	Most Aug	Annual
Trace	20.8	21.4	25.1
0.01–0.10	29.0	25.2	24.1
0.11–0.25	4.1	10.6	6.7
0.26–0.50	1.0	8.6	3.4
0.51–1.00	0.3	5.4	1.3
1.01–2.50	0.0	1.9	0.3
2.51–5.00	0.0	0.0	0.0
5.01–10.00	0.0	0.0	0.0
TOTAL	34.4	51.7	35.8

4 Moses Point

Inches	Least Jun	Most Aug	Annual
Trace	23.7	21.6	24.2
0.01–0.10	17.7	19.4	18.7
0.11–0.25	5.7	10.3	7.3
0.26–0.50	0.1	11.9	4.1
0.51–1.00	0.0	6.5	1.8
1.01–2.50	0.0	2.6	0.4
2.51–5.00	0.0	0.0	0.0
5.01–10.00	0.0	0.0	0.0
TOTAL	23.5	50.7	32.3

5 Unalakleet

Inches	Least Dec	Most Aug	Annual
Trace	30.9	18.3	29.1
0.01–0.10	18.1	25.9	21.1
0.11–0.25	2.6	15.1	6.3
0.26–0.50	0.8	10.8	3.0
0.51–1.00	0.0	5.8	1.1
1.01–2.50	0.0	1.2	0.2
2.51–5.00	0.0	0.0	0.0
5.01–10.00	0.0	0.0	0.0
TOTAL	21.5	58.8	31.7

6 Cape Romanzof

Inches	Least Apr	Most Aug	Annual
Trace	28.5	21.3	24.1
0.01–0.10	23.0	27.4	22.8
0.11–0.25	3.9	12.6	8.1
0.26–0.50	1.5	12.9	5.1
0.51–1.00	0.9	7.7	3.0
1.01–2.50	0.0	3.2	0.9
2.51–5.00	0.0	0.3	*
5.01–10.00	0.0	0.0	0.0
TOTAL	29.3	64.1	39.9

7 Bethel

Inches	Least Apr	Most Aug	Annual
Trace	29.8	18.9	26.4
0.01–0.10	27.7	31.0	27.5
0.11–0.25	4.4	17.7	8.8
0.26–0.50	1.6	7.9	3.6
0.51–1.00	0.0	6.0	1.3
1.01–2.50	0.0	1.3	0.2
2.51–5.00	0.0	0.0	*
5.01–10.00	0.0	0.0	0.0
TOTAL	33.7	63.9	41.5

8 Cape Newenham

Inches	Least Apr	Most Aug	Annual
Trace	21.7	17.6	25.8
0.01–0.10	31.6	24.6	24.1
0.11–0.25	7.0	14.1	13.6
0.26–0.50	4.0	14.1	5.0
0.51–1.00	1.0	9.4	2.5
1.01–2.50	0.3	6.2	0.4
2.51–5.00	0.0	0.6	0.0
5.01–10.00	0.0	0.0	0.0
TOTAL	43.7	69.0	45.6

9 King Salmon

Inches	Least Apr	Most Aug	Annual
Trace	27.0	18.8	23.8
0.01–0.10	21.6	29.0	25.1
0.11–0.25	5.7	15.7	9.8
0.26–0.50	1.9	10.8	4.5
0.51–1.00	0.5	3.2	1.5
1.01–2.50	0.2	0.7	0.2
2.51–5.00	0.0	0.0	0.0
5.01–10.00	0.0	0.0	0.0
TOTAL	29.9	59.4	41.1

10 St. Paul

Inches	Least Apr	Most Aug	Annual
Trace	32.2	25.1	27.6
0.01–0.10	39.6	36.0	39.0
0.11–0.25	7.5	13.9	11.9
0.26–0.50	2.0	7.9	4.7
0.51–1.00	0.6	4.1	1.6
1.01–2.50	0.0	1.6	0.4
2.51–5.00	0.0	0.0	0.0
5.01–10.00	0.0	0.0	0.0
TOTAL	49.7	63.5	57.6

11 Port Heiden

Inches	Least Apr	Most Aug	Annual
Trace	51.1	19.4	33.2
0.01–0.10	22.2	29.1	27.9
0.11–0.25	1.1	16.1	8.9
0.26–0.50	1.1	1.6	3.3
0.51–1.00	0.0	9.7	1.4
1.01–2.50	0.0	0.0	0.0
2.51–5.00	0.0	0.0	0.0
5.01–10.00	0.0	0.0	0.0
TOTAL	24.4	56.5	41.5

12 Port Moller

Inches	Least Feb	Most Aug	Annual
Trace	23.9	11.3	17.9
0.01–0.10	24.8	30.6	30.0
0.11–0.25	10.6	16.1	14.4
0.26–0.50	2.7	17.7	8.2
0.51–1.00	0.9	8.1	3.6
1.01–2.50	0.0	4.0	1.6
2.51–5.00	0.0	0.8	0.2
5.01–10.00	0.0	0.0	0.0
TOTAL	39.0	77.3	58.6

13 Driftwood Bay

Inches	Least Apr	Most Jul	Annual
Trace	33.3	17.1	28.0
0.01–0.10	32.7	35.5	31.0
0.11–0.25	3.3	10.1	7.0
0.26–0.50	0.0	6.0	3.2
0.51–1.00	0.7	2.3	1.2
1.01–2.50	0.0	1.6	0.8
2.51–5.00	0.0	0.0	0.1
5.01–10.00	0.0	0.0	0.0
TOTAL	36.7	72.6	43.3

14 Nikolski

Inches	Least Apr	Most Aug	Annual
Trace	37.8	15.0	22.1
0.01–0.10	38.9	32.5	39.8
0.11–0.25	2.2	10.0	7.1
0.26–0.50	3.3	4.2	3.1
0.51–1.00	0.0	5.8	2.2
1.01–2.50	0.0	2.5	0.8
2.51–5.00	0.0	0.0	0.0
5.01–10.00	0.0	0.0	0.0
TOTAL	44.4	55.0	53.0

15 Adak

Inches	Least Jul	Most Dec	Annual
Trace	40.1	17.2	22.2
0.01–0.10	24.3	34.2	34.0
0.11–0.25	12.4	18.9	16.4
0.26–0.50	7.7	11.2	10.6
0.51–1.00	2.3	7.5	6.0
1.01–2.50	1.4	5.5	3.1
2.51–5.00	0.0	0.6	0.3
5.01–10.00	0.0	0.0	0.0
TOTAL	48.1	77.9	70.4

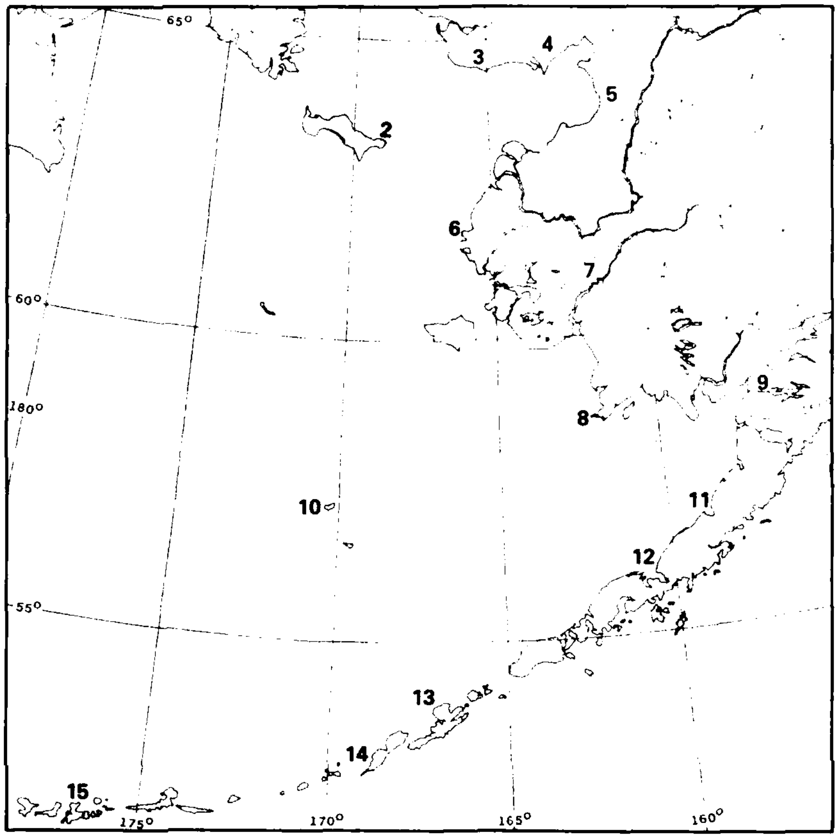
Figure 11 Precipitation intensities

Legend

Percentage frequency of occurrence of snowfall is based on daily observations. In each table column 2 is the month of the year that averages the most, and column 3 is annual percent averaged over 12 months. Column 3 shows the number of months of the year with any snowfall. The total at the bottom of each box is the percent of days with measurable snowfall.

* less than 0.05%

Prepared from USAF Air Weather Service data, various dates.



2 Northeast Cape

Inches	Max Month Nov	Annual Based on 10 Months
≤Trace	47.1	81.7
0.1–2.4	50.0	17.4
2.5–4.4	2.5	0.8
4.5–6.4	0.4	0.1
6.5–10.4	0.0	0.0
10.5–15.4	0.0	0.0
15.5–25.4	0.0	0.0
25.5–50.4	0.0	0.0
TOTAL	52.9	18.3

3 Nome

Inches	Max Month Nov	Annual Based on 11 Months
≤Trace	62.0	80.4
0.1–2.4	35.3	18.4
2.5–4.4	2.0	0.9
4.5–6.4	0.4	0.2
6.5–10.4	0.3	0.1
10.5–15.4	0.0	0.0
15.5–25.4	0.0	0.0
25.5–50.4	0.0	0.0
TOTAL	38.0	19.6

4 Moses Point

Inches	Max Month Dec	Annual Based on 10 Months
≤Trace	65.5	83.3
0.1–2.4	28.7	14.3
2.5–4.4	3.9	1.7
4.5–6.4	1.3	0.5
6.5–10.4	0.3	0.2
10.5–15.4	0.3	*
15.5–25.4	0.0	0.0
25.5–50.4	0.0	0.0
TOTAL	34.5	16.7

5 Unalakleet

Inches	Max Month Nov	Annual Based on 9 Months
≤Trace	76.8	88.0
0.1–2.4	20.4	11.2
2.5–4.4	2.2	0.6
4.5–6.4	0.4	0.2
6.5–10.4	0.2	*
10.5–15.4	0.0	*
15.5–25.4	0.0	0.0
25.5–50.4	0.0	0.0
TOTAL	23.2	12.0

6 Cape Romanzof

Inches	Max Month Mar	Annual Based on 11 Months
≤Trace	66.9	80.1
0.1–2.4	27.0	17.9
2.5–4.4	3.8	1.4
4.5–6.4	0.6	0.3
6.5–10.4	1.2	0.2
10.5–15.4	0.6	0.1
15.5–25.4	0.0	0.0
25.5–50.4	0.0	0.0
TOTAL	33.1	19.9

7 Bethel

Inches	Max Month Mar	Annual Based on 10 Months
≤Trace	60.6	80.6
0.1–2.4	36.4	18.1
2.5–4.4	2.0	0.8
4.5–6.4	0.5	0.3
6.5–10.4	0.3	0.2
10.5–15.4	0.2	0.0
15.5–25.4	0.0	*
25.5–50.4	0.0	0.0
TOTAL	39.3	19.3

8 Cape Newenham

Inches	Max Month Mar	Annual Based on 10 Months
≤Trace	56.7	75.9
0.1–2.4	18.0	21.6
2.5–4.4	2.2	1.8
4.5–6.4	0.4	0.4
6.5–10.4	1.0	0.1
10.5–15.4	0.7	0.1
15.5–25.4	0.0	0.0
25.5–50.4	0.0	0.0
TOTAL	43.3	24.1

9 King Salmon

Inches	Max Month Mar	Annual Based on 8 Months
≤Trace	70.0	86.0
0.1–2.4	28.4	13.1
2.5–4.4	1.0	0.7
4.5–6.4	0.3	0.2
6.5–10.4	0.3	*
10.5–15.4	0.0	0.0
15.5–25.4	0.0	0.0
25.5–50.4	0.0	0.0
TOTAL	30.0	14.0

10 St. Paul

Inches	Max Month Jan	Annual Based on 10 Months
≤Trace	57.2	75.3
0.1–2.4	40.0	23.9
2.5–4.4	1.8	0.6
4.5–6.4	0.3	0.1
6.5–10.4	0.6	0.1
10.5–15.4	0.1	*
15.5–25.4	0.0	0.0
25.5–50.4	0.0	0.0
TOTAL	42.8	24.7

11 Port Heiden

Inches	Max Month Dec	Annual Based on 8 Months
≤Trace	82.2	89.7
0.1–2.4	16.1	9.9
2.5–4.4	0.0	0.1
4.5–6.4	1.6	0.3
6.5–10.4	0.0	0.0
10.5–15.4	0.0	0.0
15.5–25.4	0.0	0.0
25.5–50.4	0.0	0.0
TOTAL	17.8	10.3

12 Port Moller

Inches	Max Month Jan	Annual Based on 10 Months
≤Trace	60.2	80.6
0.1–2.4	31.2	16.7
2.5–4.4	4.3	1.9
4.5–6.4	1.1	0.4
6.5–10.4	3.2	0.4
10.5–15.4	0.0	0.0
15.5–25.4	0.0	0.0
25.5–50.4	0.0	0.0
TOTAL	39.8	19.4

13 Driftwood Bay

Inches	Max Month Jan	Annual Based on 10 Months
≤Trace	73.1	84.7
0.1–2.4	23.2	13.7
2.5–4.4	1.6	1.0
4.5–6.4	0.0	0.3
6.5–10.4	0.5	*
10.5–15.4	1.1	0.1
15.5–25.4	0.0	0.0
25.5–50.4	0.5	*
TOTAL	26.9	15.3

14 Nikolski

Inches	Max Month Feb	Annual Based on 8 Months
≤Trace	54.1	87.7
0.1–2.4	43.5	11.5
2.5–4.4	1.2	0.5
4.5–6.4	0.0	0.2
6.5–10.4	1.2	0.1
10.5–15.4	0.0	0.0
15.5–25.4	0.0	0.0
25.5–50.4	0.0	0.0
TOTAL	45.9	12.3

15 Adak

Inches	Max Month Feb	Annual Based on 11 Months
≤Trace	47.4	77.8
0.1–2.4	44.4	19.1
2.5–4.4	5.5	2.2
4.5–6.4	2.5	0.6
6.5–10.4	0.2	0.1
10.5–15.4	0.0	*
15.5–25.4	0.0	*
25.5–50.4	0.0	0.0
TOTAL	52.6	22.2

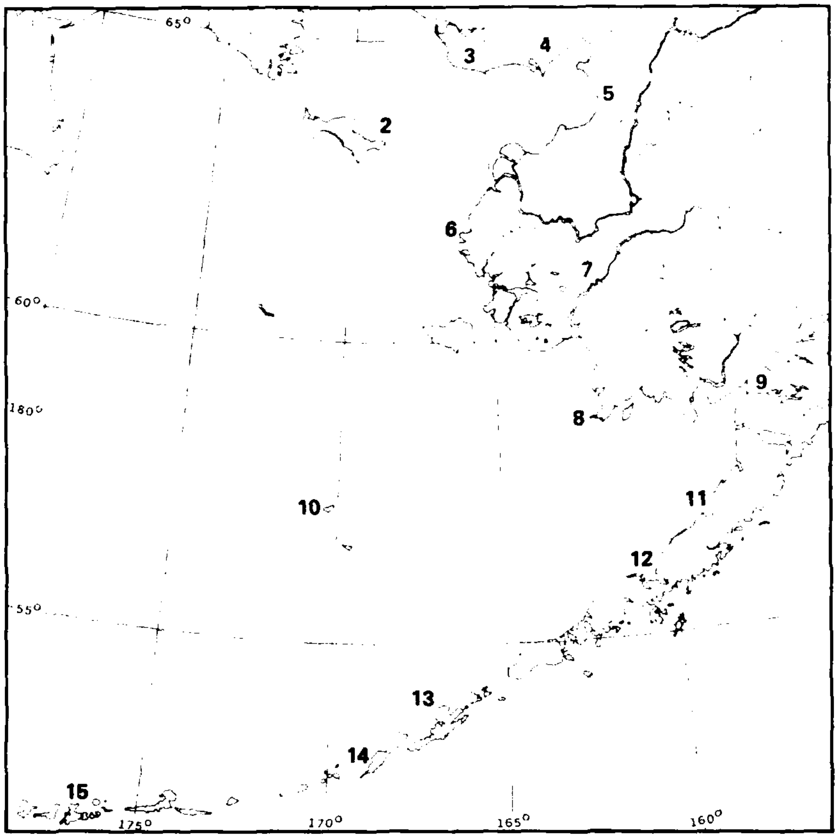
Figure 12 Snowfall

Legend

Percentage frequency of occurrence of snow depth is based on daily observations. In each table column 2 is the month of the year that averages the most, and column 3 is annual percent averaged over 12 months. Column 3 shows the number of months of the year with any snow depth. The total at the bottom of each box is the percent of days with measurable snow depth.

* less than 0.05%

Prepared from USAF Air Weather Service data, various dates.



2 Northeast Cape

Inches	Max Month Feb	Annual Based on 10 Months
≤Trace	0.0	40.9
1–3	0.0	9.2
4–6	0.0	8.7
7–12	32.7	15.4
13–24	54.3	17.0
25–36	7.6	8.2
37–48	5.4	0.6
49–60	0.0	0.0
TOTAL	100.0	49.1

3 Nome

Inches	Max Month Feb	Annual Based on 10 Months
≤Trace	2.7	44.6
1–3	4.8	9.0
4–6	4.4	6.9
7–12	14.3	12.0
13–24	40.8	15.1
25–36	23.4	8.5
37–48	3.0	2.6
≥49	6.7	1.3
TOTAL	97.3	55.4

4 Moses Point

Inches	Max Month Apr	Annual Based on 10 Months
≤Trace	0.0	44.8
1–3	0.0	5.8
4–6	0.7	5.8
7–12	18.3	11.5
13–24	38.6	14.8
25–36	8.8	5.6
37–48	9.1	4.4
≥49	24.5	7.3
TOTAL	100.0	55.2

5 Unalakleet

Inches	Month Feb	Annual Based on 9 Months
≤Trace	1.4	50.5
1–3	18.4	15.9
4–6	17.9	10.7
7–12	32.0	12.3
13–24	22.8	9.0
25–36	6.2	1.5
37–48	1.2	0.1
49–60	0.0	0.0
TOTAL	98.6	49.5

6 Cape Romanzof

Inches	Max Month Mar	Annual Based on 10 Months
≤Trace	0.0	39.2
1–3	8.0	14.9
4–6	7.7	12.8
7–12	23.4	12.5
13–24	37.2	15.6
25–36	15.9	2.6
37–48	1.1	1.1
≥49	6.6	1.3
TOTAL	100.0	60.8

7 Bethel

Inches	Max Month Mar	Annual Based on 9 Months
≤Trace	0.8	52.9
1–3	14.8	14.1
4–6	19.2	11.5
7–12	25.3	9.6
13–24	28.0	9.2
25–36	10.0	2.4
37–48	2.0	0.3
49–60	0.0	0.0
TOTAL	99.2	47.1

8 Cape Newenham

Inches	Max Month Apr	Annual Based on 11 Months
≤Trace	12.9	53.3
1–3	23.8	17.3
4–6	17.8	8.3
7–12	11.6	9.0
13–24	9.6	6.7
25–36	14.9	3.5
37–48	9.0	1.7
49–60	0.4	0.1
TOTAL	87.1	46.7

9 King Salmon

Inches	Max Month Feb	Annual Based on 7 Months
≤Trace	18.8	69.1
1–3	37.8	16.1
4–6	24.4	8.2
7–12	10.1	5.1
13–24	8.9	1.5
25–36	0.0	0.0
37–48	0.0	0.0
49–60	0.0	0.0
TOTAL	81.2	30.9

10 St. Paul

Inches	Max Month Mar	Annual Based on 9 Months
≤Trace	20.0	61.4
1–3	29.4	14.1
4–6	14.0	7.2
7–12	16.0	6.0
13–24	13.2	4.1
25–36	7.3	1.0
37–48	0.0	0.0
49–60	0.1	*
TOTAL	80.0	32.6

11 Port Heiden

Inches	Max Month Dec	Annual Based on 8 Months
≤Trace	48.4	82.1
1–3	30.6	15.2
4–6	11.3	1.6
7–12	9.7	1.1
13–24	0.0	0.0
25–36	0.0	0.0
37–48	0.0	0.0
49–60	0.0	0.0
TOTAL	51.6	17.9

12 Port Moller

Inches	Max Month Mar	Annual Based on 9 Months
≤Trace	16.9	60.9
1–3	31.5	14.3
4–6	18.5	9.7
7–12	8.0	7.0
13–24	7.4	6.2
25–36	17.7	1.9
37–48	0.0	0.0
49–60	0.0	0.0
TOTAL	83.1	39.1

13 Driftwood Bay

Inches	Max Month Apr	Annual Based on 9 Months
≤Trace	31.1	59.6
1–3	24.4	12.3
4–6	10.0	5.6
7–12	1.1	9.9
13–24	0.0	5.2
25–36	0.0	0.4
37–48	0.0	0.9
49–60	33.4	6.1
TOTAL	68.9	40.4

14 Nikolski

Inches	Max Month Mar	Annual Based on 7 Months
≤Trace	84.7	93.1
1–3	10.5	6.2
4–6	5.8	0.6
7–12	0.0	0.1
13–24	0.0	0.0
25–36	0.0	0.0
37–48	0.0	0.0
49–60	0.0	0.0
TOTAL	15.3	6.9

15 Adak

Inches	Max Month Mar	Annual Based on 8 Months
≤Trace	70.5	84.7
1–3	20.3	9.9
4–6	6.0	2.8
7–12	1.8	1.8
13–24	0.9	0.7
25–36	0.5	0.1
37–48	0.0	0.0
49–60	0.0	0.0
TOTAL	29.5	15.3

Figure 13 Snow depth

Legend

Percent frequency of occurrence of precipitation by type is based on hourly observations regardless of intensity

R or L - Rain or drizzle

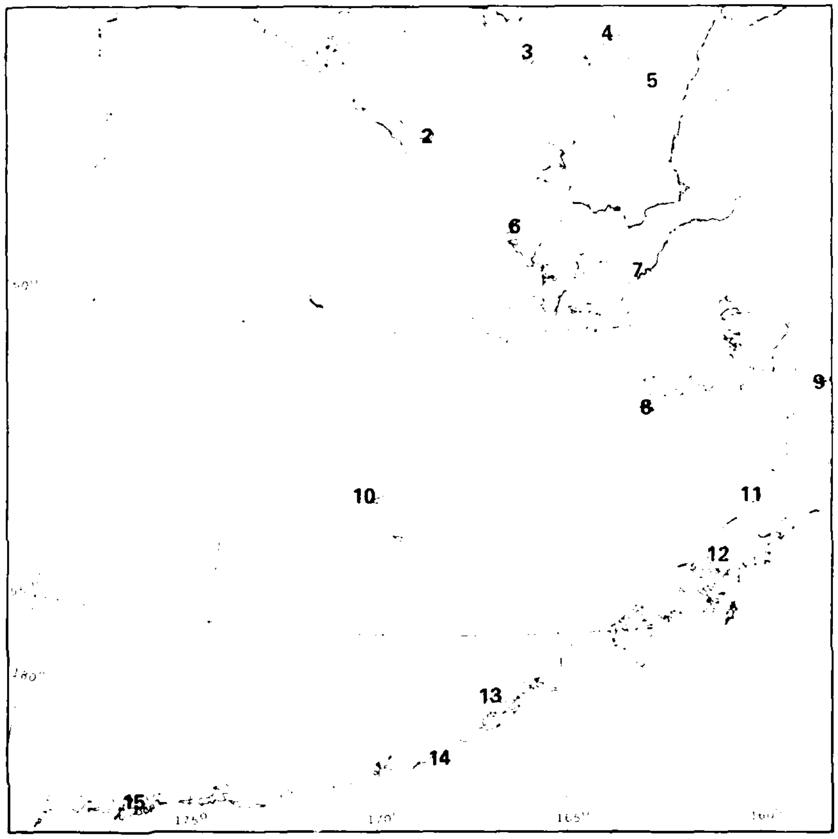
ZR or ZL Freezing rain or freezing drizzle

S or E - Snow or sleet

TOT Total percent of observations with precipitation

* less than 0.05%

Prepared from USAF Air Weather Service data, various dates.



2 Northeast Cape

	R or L	ZR or ZL	S or E	TOT
Jan	1.1	0.5	17.0	18.1
Feb	1.1	0.7	17.7	19.4
Mar	0.7	*	21.4	22.0
Apr	1.2	0.2	21.0	22.1
May	7.6	0.1	14.6	21.7
Jun	15.4	0.2	1.1	16.6
Jul	19.8	0.0	*	19.8
Aug	27.0	0.0	0.1	27.0
Sep	25.9	0.0	3.3	29.1
Oct	9.3	0.1	19.5	28.0
Nov	1.9	0.6	34.2	36.5
Dec	1.1	0.2	21.2	22.0
Ann	9.9	0.2	13.9	23.7

3 Nome

	R or L	ZR or ZL	S or E	TOT
Jan	1.4	3.7	25.2	28.7
Feb	0.7	2.2	23.2	24.9
Mar	0.6	0.8	27.1	27.8
Apr	2.6	0.8	25.8	28.0
May	10.9	0.2	10.3	20.3
Jun	16.6	0.1	0.7	17.2
Jul	25.0	0.0	0.0	25.0
Aug	31.6	0.0	0.0	31.6
Sep	24.3	0.0	1.6	25.7
Oct	9.4	0.2	13.5	21.9
Nov	2.9	1.8	26.3	29.5
Dec	0.5	2.5	25.0	26.7
Ann	10.5	1.0	14.9	25.6

4 Moses Point

	R or L	ZR or ZL	S or E	TOT
Jan	0.0	1.1	17.9	18.8
Feb	0.3	0.7	18.3	19.1
Mar	0.2	0.0	23.4	23.5
Apr	1.9	0.0	18.8	20.3
May	8.1	0.0	5.9	13.7
Jun	11.5	0.0	0.0	11.5
Jul	18.4	0.0	0.0	18.4
Aug	27.9	0.0	0.0	27.9
Sep	22.0	0.0	0.7	22.5
Oct	8.3	0.1	12.9	20.8
Nov	2.2	0.8	21.6	24.1
Dec	0.5	0.8	27.2	28.0
Ann	8.5	0.3	12.2	20.7

5 Unalakleet

	R or L	ZR or ZL	S or E	TOT
Jan	0.8	2.1	15.9	18.3
Feb	0.3	1.0	18.1	19.2
Mar	0.6	0.3	19.2	19.8
Apr	1.8	0.1	15.6	17.3
May	8.3	0.1	4.6	12.7
Jun	13.4	*	0.3	13.5
Jul	18.9	0.0	0.0	18.9
Aug	25.5	0.0	0.0	25.5
Sep	17.7	0.0	1.3	18.9
Oct	4.7	0.2	11.8	16.3
Nov	0.7	0.5	18.3	19.3
Dec	0.2	0.8	17.0	17.7
Ann	7.7	0.4	10.2	18.1

6 Cape Romanzof

	R or L	ZR or ZL	S or E	TOT
Jan	1.9	0.2	11.8	13.7
Feb	0.9	0.2	14.3	15.2
Mar	0.9	0.3	17.1	18.1
Apr	1.5	0.2	17.7	19.2
May	9.2	0.4	11.8	20.7
Jun	19.8	*	1.2	20.9
Jul	26.9	0.0	*	26.9
Aug	34.4	0.0	0.1	34.4
Sep	27.8	0.0	2.5	30.1
Oct	8.0	0.2	18.1	25.6
Nov	2.9	0.4	21.0	23.7
Dec	1.1	0.5	16.9	18.3
Ann	11.3	0.2	11.0	22.2

7 Bethel

	R or L	ZR or ZL	S or E	TOT
Jan	2.9	1.3	19.9	23.5
Feb	2.4	0.9	21.7	24.1
Mar	2.1	0.5	24.3	26.0
Apr	4.7	0.3	19.5	23.6
May	13.9	0.2	6.6	19.9
Jun	19.8	0.0	0.5	20.2
Jul	25.4	0.0	*	25.4
Aug	35.7	0.0	0.0	35.7
Sep	25.6	0.0	0.9	26.3
Oct	10.6	0.5	10.7	21.3
Nov	4.9	1.1	19.8	25.0
Dec	2.0	1.0	25.1	27.5
Ann	12.5	0.5	12.4	24.9

8 Cape Newenham

	R or L	ZR or ZL	S or E	TOT
Jan	4.5	0.6	17.5	22.1
Feb	2.8	0.1	23.1	25.5
Mar	3.4	0.5	22.4	25.7
Apr	5.0	0.2	25.1	28.9
May	14.5	0.1	10.8	24.8
Jun	20.5	0.0	0.5	20.9
Jul	29.1	0.0	*	29.1
Aug	36.1	0.0	0.0	36.1
Sep	30.1	*	0.5	30.5
Oct	16.[illegible]	0.1	11.0	26.3
Nov	11.7	0.2	19.6	30.0
Dec	4.4	0.3	22.8	26.6
Ann	14.9	0.2	12.8	27.2

9 King Salmon

	R or L	ZR or ZL	S or E	TOT
Jan	3.9	0.5	11.9	15.8
Feb	4.4	0.4	14.0	18.0
Mar	3.9	0.2	16.3	19.9
Apr	6.6	0.1	11.4	17.5
May	15.5	*	2.4	17.4
Jun	18.6	0.0	*	18.6
Jul	22.5	0.0	0.0	22.5
Aug	27.2	0.0	0.0	27.2
Sep	21.2	0.0	0.1	21.3
Oct	14.1	0.1	5.8	19.4
Nov	7.0	0.3	9.3	16.0
Dec	3.5	0.7	14.4	18.1
Ann	12.5	0.2	7.0	19.3

10 St. Paul

	R or L	ZR or ZL	S or E	TOT
Jan	10.9	0.2	25.8	36.1
Feb	5.9	0.4	34.2	40.0
Mar	5.4	0.4	30.3	35.6
Apr	8.3	0.2	21.9	29.7
May	18.8	0.2	11.8	30.1
Jun	24.8	0.1	0.8	25.5
Jul	31.9	0.0	*	32.0
Aug	33.4	0.0	*	33.4
Sep	27.3	0.0	0.1	27.3
Oct	22.6	*	8.1	30.0
Nov	17.4	0.1	16.0	34.3
Dec	10.3	0.3	26.9	36.7
Ann	18.1	0.2	14.8	32.6

11 Port Heiden

	R or L	ZR or ZL	S or E	TOT
Jan	8.8	0.7	14.7	23.4
Feb	3.8	0.6	13.9	17.7
Mar	5.0	0.9	25.9	31.4
Apr	6.6	0.3	16.2	22.4
May	14.2	0.1	4.7	18.6
Jun	18.3	0.0	0.0	18.3
Jul	25.3	0.0	0.0	25.3
Aug	32.0	0.0	0.0	32.0
Sep	22.9	0.0	0.1	23.0
Oct	22.3	0.0	5.9	27.4
Nov	11.2	0.1	11.0	21.8
Dec	7.9	0.8	16.9	24.9
Ann	14.9	0.3	9.1	23.9

12 Port Moller

	R or L	ZR or ZL	S or E	TOT
Jan	5.9	0.3	15.8	22.0
Feb	2.4	0.4	13.6	16.3
Mar	3.5	0.1	19.7	23.3
Apr	4.1	0.5	24.5	29.1
May	12.5	0.2	7.5	20.0
Jun	15.6	0.2	1.3	17.1
Jul	25.2	0.0	0.0	25.2
Aug	26.5	0.0	0.0	26.5
Sep	19.9	0.0	0.4	20.3
Oct	12.0	0.0	6.9	18.8
Nov	9.7	0.1	13.8	23.5
Dec	3.5	0.5	17.3	21.3
Ann	11.8	0.2	10.0	22.0

13 Driftwood Bay

	R or L	ZR or ZL	S or E	TOT
Jan	4.2	*	12.9	17.0
Feb	2.0	0.2	19.5	21.5
Mar	2.3	*	14.3	16.6
Apr	4.1	0.2	12.0	16.3
May	7.9	0.1	5.8	13.7
Jun	12.1	0.0	0.4	12.4
Jul	16.0	0.0	0.0	16.0
Aug	18.2	0.0	0.0	18.2
Sep	19.0	0.0	0.1	19.2
Oct	10.1	0.2	5.9	16.2
Nov	7.4	0.2	10.2	17.8
Dec	3.3	0.3	14.0	17.6
Ann	8.9	0.1	7.9	16.9

14 Nikolski

	R or L	ZR or ZL	S or E	TOT
Jan	12.1	0.2	6.9	19.2
Feb	6.5	0.4	13.7	20.6
Mar	11.2	0.0	9.6	20.7
Apr	14.2	0.0	8.8	23.0
May	23.8	0.0	2.2	26.0
Jun	21.9	0.0	0.2	22.1
Jul	18.3	0.0	0.0	18.3
Aug	15.1	0.0	0.0	15.1
Sep	18.6	0.0	0.0	18.6
Oct	18.0	0.0	2.0	20.0
Nov	16.8	0.0	4.5	21.3
Dec	8.0	0.0	9.1	17.0
Ann	15.5	*	4.5	19.9

15 Adak

	R or L	ZR or ZL	S or E	TOT
Jan	19.4	0.1	19.1	36.2
Feb	17.7	0.1	23.5	38.5
Mar	20.0	*	21.9	39.1
Apr	24.1	*	14.4	36.2
May	36.0	*	2.8	37.9
Jun	32.7	0.0	*	32.7
Jul	31.0	0.0	0.0	31.0
Aug	34.9	0.0	0.0	34.9
Sep	33.5	*	0.1	33.5
Oct	30.2	*	2.4	32.2
Nov	24.9	*	10.1	33.6
Dec	19.9	0.1	17.1	35.1
Ann	27.0	*	9.3	35.1

Figure 14 Type of precipitation

Legend

Percent frequency of occurrence of obstructions to vision is based on hourly observations

F Fog

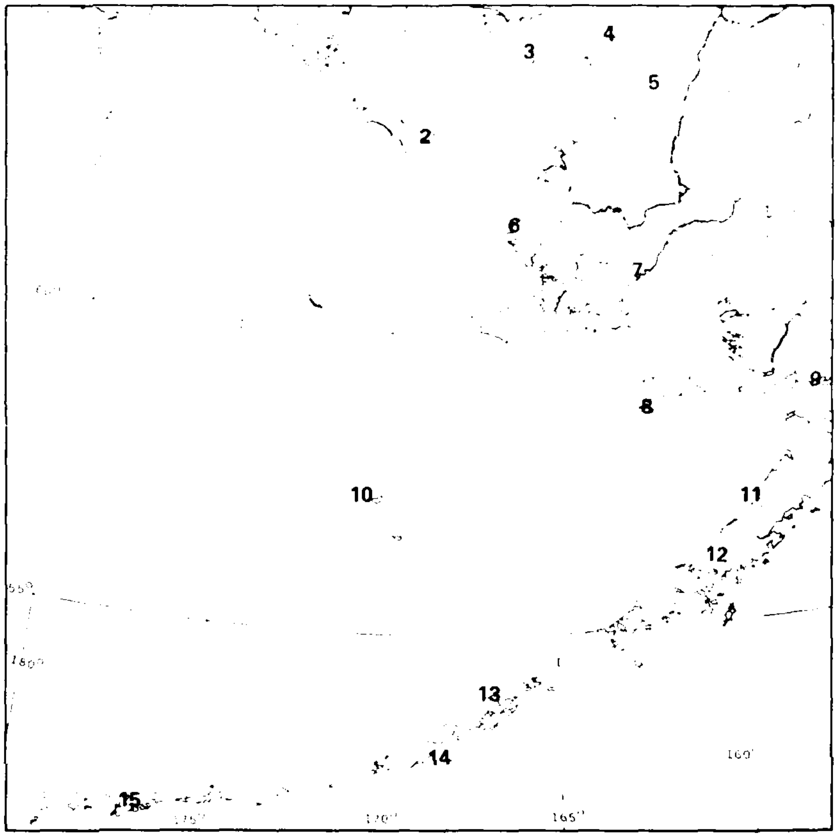
K or H Smoke or haze

BS Blowing snow

TOT Total percent of observations with obstruction to vision

* less than 0 05%

Prepared from USAF Air Weather Service data, various dates.



2 Northeast Cape

	F	K or H	BS	TOT
Jan	15.7	*	14.3	27.8
Feb	16.3	*	14.6	28.4
Mar	19.7	0.1	11.5	27.9
Apr	25.2	0.0	11.9	31.5
May	24.6	*	0.7	25.2
Jun	26.1	0.3	0.0	26.3
Jul	26.6	0.0	0.0	28.6
Aug	31.8	0.0	0.0	31.8
Sep	23.1	0.0	0.0	23.1
Oct	13.7	*	2.4	15.9
Nov	22.3	*	17.8	35.6
Dec	16.4	0.1	15.9	28.0
Ann	22.2	*	7.0	27.4

3 Nome

	F	K or H	BS	TOT
Jan	9.9	*	7.3	17.0
Feb	6.8	*	5.6	12.4
Mar	7.9	*	5.3	13.1
Apr	10.9	0.0	2.5	13.1
May	12.0	0.0	0.2	12.2
Jun	15.4	0.3	0.0	15.7
Jul	20.3	0.4	0.0	20.6
Aug	19.9	0.3	0.0	20.1
Sep	9.5	*	0.0	9.5
Oct	5.4	0.0	1.1	6.6
Nov	6.8	0.0	3.9	10.7
Dec	7.3	0.0	4.7	11.9
Ann	11.0	0.1	2.6	13.6

4 Moses Point

	F	K or H	BS	TOT
Jan				24.2
Feb				19.7
Mar				21.2
Apr				18.1
May				9.6
Jun	DATA	NOT	SUMMARIZED	7.0
Jul				13.8
Aug				17.3
Sep				10.7
Oct				12.5
Nov				20.1
Dec				26.2
Ann				16.7

5 Unalakleet

	F	K or H	BS	TOT
Jan	5.4	0.1	6.9	12.2
Feb	5.1	*	6.1	10.8
Mar	5.5	*	3.7	8.7
Apr	6.7	0.0	1.4	7.5
May	6.9	0.0	0.1	6.9
Jun	7.0	0.2	0.0	7.2
Jul	4.9	0.8	0.0	5.7
Aug	5.7	0.3	0.0	5.9
Sep	1.8	0.2	*	2.0
Oct	2.5	*	0.8	3.2
Nov	3.6	0.0	4.1	7.4
Dec	3.8	*	4.4	8.2
Ann	4.9	0.9	2.3	7.1

6 Cape Romanzof

	F	K or H	BS	TOT
Jan	19.6	0.0	20.9	35.4
Feb	22.3	0.1	22.6	38.3
Mar	28.3	0.1	17.7	39.7
Apr	31.5	0.3	14.2	38.6
May	26.2	0.0	1.0	26.5
Jun	24.1	0.2	0.0	24.3
Jul	28.6	*	0.0	28.6
Aug	25.9	0.0	0.0	25.9
Sep	17.0	0.1	0.2	17.2
Oct	10.8	0.1	4.0	14.1
Nov	13.0	*	14.5	25.6
Dec	16.4	0.1	18.8	31.2
Ann	22.0	0.1	9.5	28.8

7 Bethel

	F	K or H	BS	TOT
Jan	10.9	*	4.4	15.0
Feb	8.0	0.0	4.1	11.5
Mar	8.4	0.1	4.0	11.8
Apr	8.8	0.0	1.5	9.9
May	6.4	0.0	0.2	6.6
Jun	5.6	0.4	0.0	6.0
Jul	10.8	0.5	0.0	11.2
Aug	15.9	0.2	0.0	16.0
Sep	9.7	0.0	0.0	9.7
Oct	7.6	*	0.2	7.8
Nov	8.7	*	1.6	10.1
Dec	8.4	*	3.8	11.8
Ann	9.1	0.1	1.7	10.6

8 Cape Newenham

	F	K or H	BS	TOT
Jan	26.0	*	8.7	31.4
Feb	24.[illegible]	*	9.0	29.5
Mar	27.0	0.0	8.5	31.9
Apr	29.8	0.0	6.3	33.0
May	28.4	*	0.7	28.7
Jun	29.5	*	0.0	29.5
Jul	37.3	0.5	0.0	37.6
Aug	34.9	*	0.0	34.9
Sep	18.7	0.0	0.0	18.7
Oct	12.8	*	1.0	13.7
Nov	20.1	*	4.9	23.8
Dec	24.3	*	9.4	30.9
Ann	26.1	*	4.0	28.6

9 King Salmon

	F	K or H	BS	TOT
Jan	6.7	0.1	2.6	9.4
Feb	5.5	0.0	1.5	7.0
Mar	6.2	*	1.6	7.8
Apr	5.4	0.1	0.2	5.7
May	5.3	0.1	*	5.6
Jun	8.6	0.1	*	9.0
Jul	14.5	0.8	0.0	15.4
Aug	15.9	0.1	0.0	16.0
Sep	6.3	0.0	0.0	6.3
Oct	5.3	*	0.2	5.6
Nov	7.1	*	0.7	7.8
Dec	8.1	0.1	1.4	9.6
Ann	8.0	0.1	0.7	8.8

10 St. Paul

	F	K or H	BS	TOT
Jan	17.5	*	7.2	24.2
Feb	17.8	0.2	13.2	27.3
Mar	16.2	*	10.7	25.6
Apr	18.5	*	4.4	22.3
May	30.0	0.0	0.4	30.4
Jun	40.8	*	0.0	40.8
Jul	56.1	0.0	0.0	56.1
Aug	43.6	0.0	0.0	43.6
Sep	23.8	0.1	0.0	23.8
Oct	8.5	*	*	8.5
Nov	10.0	0.1	1.3	12.2
Dec	10.9	0.0	6.3	17.2
Ann	24.6	*	3.6	27.6

11 Port Heiden

	F	K or H	BS	TOT
Jan	7.1	*	11.3	18.4
Feb	6.8	0.1	4.5	11.4
Mar	8.2	0.1	7.6	15.5
Apr	7.6	0.3	0.9	9.1
May	6.7	0.1	0.4	7.5
Jun	11.3	0.0	0.0	11.5
Jul	20.3	0.1	0.0	20.6
Aug	23.2	0.1	0.0	23.4
Sep	8.3	0.0	0.0	8.5
Oct	5.0	*	0.2	5.3
Nov	6.6	0.0	1.4	8.1
Dec	5.1	0.1	6.2	11.8
Ann	9.7	0.1	2.7	12.6

12 Port Moller

	F	K or H	BS	TOT
Jan	14.5	0.0	4.3	17.7
Feb	18.6	0.0	4.2	20.9
Mar	23.7	0.2	4.7	26.2
Apr	32.4	0.0	4.0	33.6
May	23.5	0.0	0.3	23.5
Jun	35.0	0.0	0.1	35.0
Jul	40.0	0.1	0.0	40.0
Aug	34.9	0.4	0.0	35.2
Sep	17.8	0.3	0.0	18.1
Oct	17.7	0.1	0.9	18.6
Nov	18.7	0.2	4.6	22.4
Dec	15.8	0.0	11.9	24.9
Ann	24.4	0.1	2.9	26.4

13 Driftwood Bay

	F	K or H	BS	TOT
Jan	14.1	0.1	7.6	20.1
Feb	18.6	0.4	10.2	27.0
Mar	18.4	0.4	9.4	24.0
Apr	24.9	0.6	6.6	28.6
May	32.0	0.3	2.3	33.5
Jun	41.2	0.1	0.1	41.3
Jul	45.8	0.3	0.0	46.1
Aug	43.0	0.2	0.0	43.2
Sep	33.8	0.8	0.0	34.6
Oct	16.8	0.6	1.5	18.7
Nov	17.1	0.6	3.7	20.4
Dec	15.6	0.7	6.7	21.7
Ann	26.8	0.4	4.0	29.9

14 Nikolski

	F	K or H	BS	TOT
Jan	26.1	0.2	1.5	26.9
Feb	17.1	0.1	3.1	19.4
Mar	20.9	0.0	2.5	22.6
Apr	26.0	0.0	1.2	27.2
May	34.7	0.0	0.7	35.4
Jun	57.1	0.0	0.0	57.1
Jul	72.9	0.0	0.0	72.9
Aug	66.3	0.0	0.0	66.3
Sep	40.8	0.1	0.0	40.9
Oct	16.7	0.0	0.0	16.7
Nov	17.4	0.0	0.1	17.4
Dec	15.4	0.0	1.5	16.2
Ann	34.9	*	0.8	35.4

15 Adak

	F	K or H	BS	TOT
Jan	5.3	0.2	2.7	8.4
Feb	4.1	0.3	2.9	7.4
Mar	6.1	0.4	1.6	8.3
Apr	7.1	0.3	0.5	8.0
May	11.4	0.6	0.0	12.2
Jun	24.9	0.3	0.0	25.5
Jul	34.2	0.2	0.0	34.7
Aug	32.0	0.3	0.0	32.3
Sep	19.9	0.2	0.0	20.4
Oct	9.4	0.2	0.0	9.6
Nov	7.5	0.3	0.5	8.3
Dec	6.8	0.3	1.9	9.1
Ann	14.1	0.3	0.8	15.3

Figure 15 Visibility obstructions

Northeast Cape

Ceiling (in feet)	Visibility ≥ 3	≥ 1½	≥ 1	≥ ¾	≥ ½	≥ ¼	≥ 0
≥ 1,800	57	58	58	58	59	59	59
≥ 1,500	63	65	66	66	66	66	67
≥ 1,200	69	71	72	72	73	73	73
≥ 1,000	72	75	76	76	77	77	78
≥ 900	74	77	79	79	80	80	80
≥ 800	76	80	82	83	83	84	84
≥ 700	78	83	85	86	87	87	87
≥ 600	80	86	89	89	90	90	91
≥ 500	82	88	93	93	93	94	94
≥ 400	83	89	93	94	95	96	96
≥ 300	83	90	94	95	97	97	98
≥ 200	83	90	94	95	97	98	99
≥ 100	83	90	94	95	97	99	99
≥ 0	83	90	94	95	97	99	100

Nome

Ceiling (in feet)	Visibility ≥ 3	≥ 1½	≥ 1	≥ ¾	≥ ½	≥ ¼	≥ 0
≥ 1,800	74	74	75	75	75	75	75
≥ 1,500	84	86	87	87	87	87	87
≥ 1,200	89	91	92	92	92	92	92
≥ 1,000	90	93	94	95	95	95	95
≥ 900	91	93	95	95	95	95	95
≥ 800	91	95	96	96	97	97	97
≥ 700	92	95	97	97	97	97	97
≥ 600	92	95	97	97	98	98	98
≥ 500	92	96	98	98	98	98	98
≥ 400	92	96	98	98	99	99	99
≥ 300	92	96	98	98	99	99	99
≥ 200	92	96	98	99	99	100	100
≥ 100	92	96	93	99	100	100	100
≥ 0	92	96	93	99	100	100	100

Moses Point

Ceiling (in feet)	Visibility ≥ 3	≥ 1½	≥ 1	≥ ¾	≥ ½	≥ ¼	≥ 0
≥ 1,800	83	84	84	84	84	84	84
≥ 1,500	87	87	88	88	88	88	88
≥ 1,200	89	90	91	91	91	91	91
≥ 1,000	91	92	93	93	94	94	94
≥ 900	92	93	94	94	95	95	95
≥ 800	92	94	95	95	96	96	96
≥ 700	92	94	96	96	97	97	97
≥ 600	92	95	96	97	97	98	98
≥ 500	93	95	97	97	98	98	98
≥ 400	93	95	97	97	98	99	99
≥ 300	93	95	97	98	99	99	99
≥ 200	93	95	97	98	99	99	99
≥ 100	93	95	97	98	99	99	100
≥ 0	93	95	97	98	99	99	100

Unalakleet

Ceiling (in feet)	Visibility ≥ 3	≥ 1½	≥ 1	≥ ¾	≥ ½	≥ ¼	≥ 0
≥ 1,800	85	86	86	86	86	86	86
≥ 1,500	88	89	89	89	89	89	89
≥ 1,200	90	91	91	91	91	91	92
≥ 1,000	92	93	94	94	94	94	94
≥ 900	92	94	94	95	95	95	95
≥ 800	93	95	96	96	96	96	96
≥ 700	94	96	96	96	97	97	97
≥ 600	94	96	97	97	97	97	98
≥ 500	94	97	98	98	98	98	99
≥ 400	04	97	98	98	98	99	99
≥ 300	95	97	98	98	99	99	99
≥ 200	95	97	98	99	99	99	100
≥ 100	95	97	98	99	99	100	100
≥ 0	95	97	98	99	99	100	100

Cape Romanzof

Ceiling (in feet)	Visibility ≥ 3	≥ 1½	≥ 1	≥ ¾	≥ ½	≥ ¼	≥ 0
≥ 1,800	56	56	56	56	56	56	56
≥ 1,500	66	67	67	67	67	67	67
≥ 1,200	74	75	75	75	75	75	75
≥ 1,000	81	82	82	83	83	83	83
≥ 900	83	84	85	85	85	85	85
≥ 800	86	88	89	89	89	89	89
≥ 700	88	91	91	91	91	91	91
≥ 600	90	93	94	94	94	94	94
≥ 500	91	95	96	96	96	96	96
≥ 400	92	96	97	97	98	98	98
≥ 300	92	96	98	98	99	99	99
≥ 200	92	97	98	98	99	99	99
≥ 100	92	97	98	99	99	100	100
≥ 0	92	97	98	99	99	100	100

Cape Newenham

Ceiling (in feet)	Visibility ≥ 3	≥ 1½	≥ 1	≥ ¾	≥ ½	≥ ¼	≥ 0
≥ 1,800	52	53	53	53	54	54	54
≥ 1,500	57	58	58	59	59	59	59
≥ 1,200	62	63	64	64	64	64	64
≥ 1,000	65	67	67	67	67	68	68
≥ 900	67	70	70	70	71	71	71
≥ 800	70	73	74	74	75	75	75
≥ 700	73	77	78	78	79	79	79
≥ 600	77	81	83	83	84	84	84
≥ 500	79	85	87	88	88	89	89
≥ 400	81	88	91	91	92	93	93
≥ 300	82	90	93	94	95	96	96
≥ 200	82	90	94	95	97	98	98
≥ 100	82	91	94	95	97	98	99
≥ 0	82	91	94	95	97	99	100

St. Paul Island

Ceiling (in feet)	Visibility ≥ 3	≥ 1½	≥ 1	≥ ¾	≥ ½	≥ ¼	≥ 0
≥ 1,800	43	43	43	43	44	44	44
≥ 1,500	53	53	54	54	54	54	55
≥ 1,200	57	58	58	58	59	59	59
≥ 1,000	66	68	68	69	69	69	70
≥ 900	67	69	70	70	70	71	71
≥ 800	71	73	74	74	74	75	75
≥ 700	73	75	77	77	78	78	78
≥ 600	75	78	80	80	81	81	82
≥ 500	77	81	83	83	84	85	85
≥ 400	79	83	86	86	87	88	89
≥ 300	80	85	88	89	91	92	93
≥ 200	80	86	90	91	94	96	97
≥ 100	80	86	90	91	94	97	98
≥ 0	80	86	90	91	94	97	100

King Salmon

Ceiling (in feet)	Visibility ≥ 3	≥ 1½	≥ 1	≥ ¾	≥ ½	≥ ¼	≥ 0
≥ 1,800	80	81	81	82	82	82	82
≥ 1,500	83	84	85	85	85	85	85
≥ 1,200	86	87	87	87	88	88	88
≥ 1,000	88	89	90	90	90	91	91
≥ 900	89	90	91	91	91	91	92
≥ 800	90	91	92	92	93	93	93
≥ 700	90	92	93	94	94	94	94
≥ 600	91	93	94	95	95	95	96
≥ 500	92	94	95	96	96	97	97
≥ 400	92	95	96	97	97	98	98
≥ 300	93	96	97	97	98	98	99
≥ 200	93	96	97	98	99	99	99
≥ 100	93	96	97	98	99	99	100
≥ 0	93	96	97	98	99	99	100

Port Heiden

Ceiling (in feet)	Visibility ≥ 3	≥ 1½	≥ 1	≥ ¾	≥ ½	≥ ¼	≥ 0
≥ 1,800	67	68	68	68	68	68	69
≥ 1,500	73	73	74	74	74	74	74
≥ 1,200	77	78	78	78	79	79	79
≥ 1,000	82	83	84	84	84	84	85
≥ 900	83	84	85	85	85	86	86
≥ 800	86	87	88	88	89	89	89
≥ 700	87	89	90	90	90	91	91
≥ 600	89	91	92	92	93	93	93
≥ 500	90	92	93	93	94	94	95
≥ 400	90	93	94	95	95	96	96
≥ 300	91	94	95	96	97	97	97
≥ 200	91	94	96	96	97	98	98
≥ 100	91	94	96	97	98	98	99
≥ 0	91	94	96	97	98	99	100

Port Moller

Ceiling (in feet)	Visibility ≥ 3	≥ 1½	≥ 1	≥ ¾	≥ ½	≥ ¼	≥ 0
≥ 1,800	69	70	70	70	70	70	70
≥ 1,500	73	74	74	74	74	74	74
≥ 1,200	74	75	75	75	75	75	75
≥ 1,000	77	78	79	79	79	79	79
≥ 900	77	78	79	79	79	79	79
≥ 800	78	79	80	80	80	80	80
≥ 700	78	79	80	80	80	81	81
≥ 600	78	80	80	80	81	81	81
≥ 500	79	81	82	82	83	83	83
≥ 400	79	81	82	82	83	84	84
≥ 300	79	81	82	83	84	85	85
≥ 200	79	81	83	83	85	87	88
≥ 100	79	82	83	83	85	88	92
≥ 0	79	82	83	83	85	88	100

Dutch Harbor

Ceiling (in feet)	Visibility ≥ 3	≥ 1½	≥ 1	≥ ¾	≥ ½	≥ ¼	≥ 0
≥ 1,800	74	74	75	75	75	75	75
≥ 1,500	77	77	78	78	78	78	78
≥ 1,200	80	81	81	81	82	82	82
≥ 1,000	83	84	85	85	86	86	86
≥ 900	84	86	86	87	87	87	87
≥ 800	85	87	88	89	89	89	90
≥ 700	86	89	90	90	91	91	91
≥ 600	87	91	92	92	93	93	93
≥ 500	88	92	94	95	95	96	96
≥ 400	89	93	95	96	97	97	98
≥ 300	89	94	96	97	98	98	99
≥ 200	89	94	96	97	99	99	100
≥ 100	89	94	96	97	99	100	100
≥ 0	89	94	96	97	99	100	100

Driftwood Bay

Ceiling (in feet)	Visibility ≥ 3	≥ 1½	≥ 1	≥ ¾	≥ ½	≥ ¼	≥ 0
≥ 1,800	66	66	66	66	67	67	67
≥ 1,500	69	70	71	71	71	71	71
≥ 1,200	70	71	72	72	72	72	72
≥ 1,000	73	74	75	75	75	75	75
≥ 900	73	74	75	75	75	75	75
≥ 800	73	75	75	75	75	76	76
≥ 700	74	75	75	75	76	76	76
≥ 600	74	75	75	76	76	76	76
≥ 500	74	76	76	77	77	77	77
≥ 400	74	76	77	77	77	78	78
≥ 300	74	76	77	77	78	78	78
≥ 200	74	76	77	77	79	79	80
≥ 100	74	76	78	78	79	80	81
≥ 0	74	76	78	78	80	81	100

Nikolski

Ceiling (in feet)	Visibility ≥ 3	≥ 1½	≥ 1	≥ ¾	≥ ½	≥ ¼	≥ 0
≥ 1,800	56	56	56	56	57	57	57
≥ 1,500	61	61	61	61	61	61	61
≥ 1,200	61	62	62	62	62	62	62
≥ 1,000	66	67	67	67	67	68	68
≥ 900	67	67	68	68	68	68	68
≥ 800	67	68	69	69	69	69	69
≥ 700	67	68	69	69	69	70	70
≥ 600	67	68	69	69	70	70	70
≥ 500	68	69	70	70	70	71	71
≥ 400	68	69	70	70	71	71	71
≥ 300	68	69	70	70	71	72	72
≥ 200	68	69	70	70	72	72	73
≥ 100	68	69	70	71	72	73	74
≥ 0	68	69	70	71	72	73	100

Adak

Ceiling (in feet)	Visibility ≥ 3	≥ 1½	≥ 1	≥ ¾	≥ ½	≥ ¼	≥ 0
≥ 1,800	56	57	58	58	59	59	59
≥ 1,500	59	61	62	62	63	63	63
≥ 1,200	64	66	67	68	68	69	69
≥ 1,000	68	69	71	71	72	72	73
≥ 900	70	72	74	74	75	75	76
≥ 800	72	74	77	77	78	78	79
≥ 700	74	77	79	80	81	81	81
≥ 600	77	80	83	83	84	85	85
≥ 500	79	83	86	87	88	89	89
≥ 400	81	86	89	90	91	92	92
≥ 300	82	87	91	93	94	95	95
≥ 200	83	88	92	94	96	97	97
≥ 100	83	88	93	94	96	98	99
≥ 0	83	88	93	94	96	98	100

Data are presented for all months and all hours. A ceiling exists when the sky is more than half covered with clouds. The frequency of occurrence of a particular ceiling height may be determined independently by referring to totals in the extreme right hand column for each station. The frequency of occurrence of a particular visibility range may be determined independently by referring to the horizontal row of totals at the bottom of each station grid. The percentage frequency for which the station was meeting or exceeding any given set of minima may be determined from the figure at the intersection of the appropriate ceiling column and visibility row.

Data compiled by U.S. Air Force, Air Weather Service

Figure 16 Ceiling and visibility data

Wind Chill

Human and animal bodies, or any physical bodies warmer than their surroundings, lose heat. The rate of loss depends on the barriers to heat loss, such as clothing and insulation, the speed of air movement, and the air temperature. Heat loss in humans increases dramatically in moving air that is colder than skin temperature of 33°C. Even a light wind increases heat loss, while a strong wind can actually lower body temperature if the rate of loss is greater than the body's heat replacement rate.

The relationship between heat loss and the cooling power of different wind and temperature combinations is shown in Figure 17 Equivalent wind chill temperature relates a particular wind and temperature combination to whatever temperature would produce the same loss of heat at about 3 knots (6 km/hr), the normal speed of a person walking vigorously. Loss of body heat can also occur by breathing cold air into the lungs and touching or leaning against cold objects. Heat loss is not as great in bright sunlight where there is some radiant heat gain. The chart in Figure 17 applies to shady areas and cloudy days or nights and represents heat loss by convective cooling, the major source of body heat loss. Graph set No. 5 relates air temperature and wind speed. When used in conjunction with Figure 17 the percentage frequency of occurrence of various values of equivalent wind chill temperature can be estimated. Map set No. 3 shows the percentage frequency of occurrence of equivalent wind chill temperatures less than -30°C, which represents the equivalent temperature at which exposed flesh can freeze within 1 minute.

Equivalent Wind Chill Temperature																				
Wind Speed		Cooling Power Of Wind Expressed As "Equivalent Chill Temperature"																		
knots	km/hr	Temperature (°C)																		
Calm		12	8	4	0	- 4	- 8	-12	-16	-20	-24	-28	-32	-36	-40	-44	-48	- 52	- 56	- 60
		Equivalent Chill Temperature																		
3	6	12	8	4	0	- 4	- 8	-12	-16	-20	-24	-28	-32	-36	-40	-44	-48	- 52	- 56	
5	10	9	5	0	- 4	- 8	-13	-17	-22	-26	-31	-35	-40	-44	-49	-53	-58			
11	20	5	0	- 5	-10	-15	-21	-26	-31	-36	-42	-47	-52	-57						
16	30	3	-3	- 8	-14	-20	-25	-31	-37	-43	-49	-54								
22	40	1	-5	-11	-17	-23	-29	-35	-41	-47	-53	-59								
27	50	0	-6	-12	-18	-25	-31	-37	-43	-49	-56									
32	60	0	-7	-13	-19	-26	-32	-39	-45	-51	-58									
38	70	- 1	-7	-14	-20	-27	-33	-40	-46	-52										
43	80	- 1	-8	-14	-21	-27	-34	-40	-47	-53										
49	90	- 1	-8	-14	-21	-27	-34	-40	-47	-53										
54	100	- 1	-8	-14	-21	-27	-34	-40	-47	-53										
		Little Danger					Increasing Danger (Flesh May Freeze Within 1 Minute)													
		Danger Of Freezing Exposed Flesh For Properly Clothed Individuals																		

Adapted from NWS/NOAA Technical Procedures Bulletin No. 165 Effective Temperature (Wind Chill Index) 1976

Figure 17 Equivalent wind chill temperature

Marine and Coastal Climatic Atlas

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The marine observations used in computing the statistics for the maps, graphs, and tables in this atlas were taken from the National Climatic Center's (NCC) Tape Data Family 11 (TDF-11), Surface Marine Observations containing data collected by ships of various registry traveling through the study area (50° - 80°N, 130° - 180°W). Because relatively little data exist for the near-coastal zone, observations for 49 coastal land stations were combined with the marine data to present the best possible climatological picture of the outer continental shelf waters and coastal regions of Alaska.

The stations' data were taken from the edited digital files of NCC and the U.S. Air Force's Environmental Technical Applications Center in Asheville, N.C. Marine data were subjected to thorough computer and visual quality control before processing to eliminate duplicate observations and exclude or adjust elements detected during internal consistency and extreme value checks.

The percentages of the 600,000 marine and 2 million land observations that contained basic weather elements are:

	Marine	Coastal Stations
Wind	98.5	98.2
Visibility	97.8	97.4
Present weather	96.9	98.2
Sea level pressure	96.2	97.2
Air temperature	99.1	99.4
Wet bulb temperature	64.9	96.6
Sea surface temperature	86.1	–
Total cloud amount	95.6	97.8
Low cloud amount	79.1	70.1
Waves	70.8	–

With a TDF-11 inventory of the number of ships' observations by 1.0° squares, a polar projection grid was defined to give an approximate equal geographic area coverage: 1° latitude by 2° longitude for the latitude belt 50° - 61°N; 1° by 3° for 61° - 70°N; and 1° by 4° for 70° - 80°N. Element statistics (with observation counts) for each of 445 marine squares and 49 coastal stations for each month were then computed and plotted on maps. Meteorologists drew isopleths (lines connecting points of equal magnitude) on 324 element maps, making subjective adjustments when data biases or insufficient observations were evident. They also performed consistency checks in monthly patterns for each element and between elements as well as comparative checks with other marine atlases and publications (see References).

To supplement the isopleth analyses, more than 10,000 statistical graphs were produced for 39 of the coastal stations and 14 representative marine areas. The graphs represent the objective compilation of available data; they were not adjusted for suspected biases, and differences may be found when comparing the graphic data with the isopleth analyses.

The legends explain the data content of the graphs and maps, contain detailed instructions on how to read the graphs, and provide remarks to aid in interpreting the data. The following paragraphs contain additional remarks likely to be of interest to those called upon to interpret the data and provide answers to specific operational questions.

Standard deviation—Most of the graphs allow approximation of the empirical probability of occurrence of selected criteria. This is a major factor in assessing the risk involved in operational planning. For certain elements, unbiased estimates of population standard deviations are given on the graphs to provide a measure of variability. The standard deviation on these graphs is denoted by s and was computed using the expression:

$$s = \left[\frac{N \Sigma x_i^2 - (\Sigma x_i)^2}{N(N-1)} \right]^{1/2} \qquad (1)$$

where N is the number of observations in the sample and x_i is the ith realization of the random variable x.

Low-pressure centers—The roses and tracks of the low-pressure center movement maps are based on 9 years of track charts (January 1966-December 1974) prepared by the National Weather Service's National Meteorological Center. These charts show cyclone tracks based on six hourly positions of closed centers.

Frequencies of cyclone centers passing through 2½-degree "squares" were analyzed for the north Pacific Ocean to obtain the mean tracks. Primary tracks were selected along axes of maximum cyclone center frequency and secondary tracks along axes of moderate frequency. The origins (first reported closed position) were also plotted by 2½-degree "squares" and analyzed to find regions of cyclogenesis (only formation, not intensification). However, no regions of cyclogenesis were defined within the Alaskan area.

Return Periods for Maximum Sustained Winds (Coastal Stations)—Estimated maximum sustained winds speeds for selected return periods are presented in graphic and tabular form. Following the method outlined by Lieblein (1954, 1974a, 1974b), these estimates were obtained by initially fitting the extreme value distribution to each station sample containing N maximum annual wind speed values, then inverting the distribution and computing extreme values for selected probabilities. Confidence bands were then computed following the techniques of Gumbel (1958) and Gumbel and Lieblein (1954).

The extreme value distribution approaches the form:

$$F(x) = F(x;\mu,\beta) = \exp\left[-\exp\left(-\frac{x-\mu}{\beta}\right)\right] \qquad (2)$$

where F(x) is the probability that an observation is equal to or less than the specified value x, μ is the mode and β is the scale parameter. Since the wind speed data were transformed logarithmically, μ and β refer to the transformed data not the wind speed maxima. The values given on each graph for μ and β are not identical to the μ and β in equation (2) but rather are the result of exponentiating the mode and scale parameter for the distribution of the logarithms of the extreme wind speed values.

The graphic presentations, in addition to allowing determination of extremes for probabilities other than those given in the tables, also provide an indication of the "goodness of fit" of the model to the data. To analytically quantify the "goodness of fit," a Kolmogorov-Smirnov (K-S) test was performed under the null hypothesis, H_0, that there is no difference between the model and the data with a type 1 error probability (α) of 0.05. Data samples for which H_0 was not accepted are from Annette and Bethel.

The confidence limits shown by the envelope of lines about the line of "best fit" represent the level of uncertainty in the extreme value corresponding to a given probability. For this study 68 percent confidence limits were computed. This means that in 68 percent of repeated samples the true extreme value will be contained within these limits.

Sea Ice—The ice limits shown on the monthly maps of sets 14-17 reflect midmonth conditions of mean ice concentrations for different threshold values. The ice limits were derived from weekly analyses of sea ice conditions (1972-75) based on satellite imagery supplemented by conventional observations and from previously published atlases (see References). Actual concentration boundaries, under the influence of changing synoptic meteorological and oceanographic situations, may vary widely from the averages.

The following stations and representative marine areas have data plotted for analysis and graphs.

Land Stations	Lat. (^oN)	Long. (^oW)	Data Processed	No. of Obs.	Avg. No. Obs./Day
Adak	51.9	176.6	Jan 1949-Dec 1974	75,956	8
Bethel	60.8	161.8	Jul 1948-Dec 1971	66,789	8
Buhta Providenija	64.4	173.2	Jan 1959-Jun 1971	27,320	4–8
Cape Newenham	58.7	162.1	Jul 1953-Dec 1970	46,471	6–8
Cape Romanzof	61.8	166.0	Mar 1953-Nov 1968	44,624	8
Driftwood Bay	54.0	166.9	Jul 1959-May 1969	28,896	8
Gambell	63.8	171.8	Jul 1949-Jun 1953	14,588	8
King Salmon	58.7	156.7	Jan 1949-Dec 1974	75,919	8
Moses Point	64.2	162.1	Jul 1948-Jun 1967	51,723	8
Nikolski	52.9	168.8	Jun 1959-Nov 1968	27,453	8
Nome	64.5	165.4	Jan 1945-Dec 1974	87,331	8
Northeast Cape	63.3	160.5	Jun 1959-Nov 1968	27,466	8
St. Paul Island	57.2	170.2	Jan 1956-Dec 1974	51,606	8
Unalakleet	63.9	160.8	Jul 1948-Dec 1964 Apr 1968-Dec 1974	44,624	8
Representative Marine Areas					
A	60-65	Coast-175	1872-1974	8,526	
B	55-60	167-175	1872-1974	31,892	
C	55-60	Coast-167	1872-1974	46,971	
D	50-55	172-180	1872-1974	62,391	
E	50-55	165-172	1872-1974	68,020	

Note: The isopleth analyses northward of 61° latitude should be considered only as a best estimate of the actual climatology; data sparsity in this ocean area did not permit a detailed analysis.

The land and marine data used in producing the maps and graphs are at the NCC in a separate file designated the Alaskan Waters Atlas Work Tapes. Also on file are computer tabulations of monthly statistical tables for the above stations and marine areas.

The duration-of-daylight chart for the Northern Hemisphere defines daylight as the period from sunrise to sunset. The upper scale at the bottom of the chart is for the Northern Hemisphere; the lower scale is for the Southern Hemisphere. For example, daylight on July 20 of any year at 48°N is about 15 hours and 30 minutes for any longitude. The data source was the U.S. Naval Observatory (1945) and is accurate for the entire twentieth century. Further details may be obtained from *The Daylighter* of the Navy Weather Research Facility (1960). Additional light (during twilight) may be usable for many purposes. Duration of daylight in high latitudes (poleward of about 60°) becomes increasingly dependent upon atmospheric conditions and refraction, and there may be some departure from the values depicted on the charts.

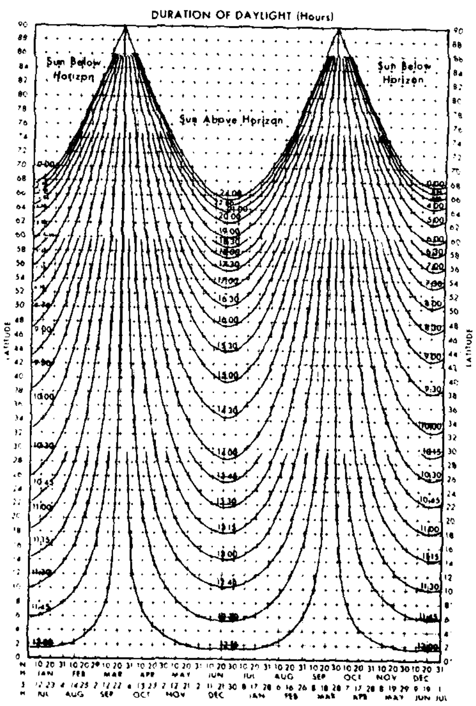


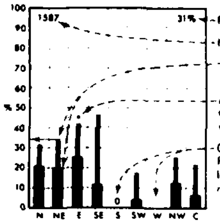
Figure 18 Duration of daylight

Legend

Precipitation/wind direction

% Pcpn — % Liquid / % Snow

Percent frequency of surface wind observations from each direction and calm that were accompanied by precipitation, subdivided into liquid type (including freezing rain and freezing drizzle) and snow



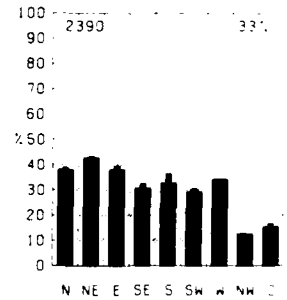
- Percentage of present weather observations reporting precipitation
- Number of observations
- (34% of all NE winds were accompanied by precipitation, of which 14% was liquid and 20% was snow
- An asterisk in the column for a given direction (or calm) indicates that the percentage was based on 10-30 observations of present weather and wind direction
- 0 replaces bar when no precipitation was observed with winds from a given direction (or calm). No bar graph is presented if less than 10 observations containing present weather were reported for a given direction (or calm)

Map - Precipitation

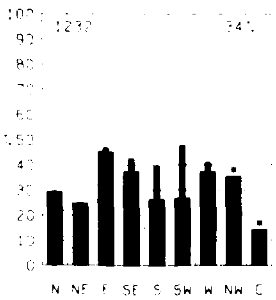
BLACK LINE Percent frequency of observations reporting precipitation

Of all the elements recorded in historical marine observations, precipitation is one of those most subject to interpretation error, from coding practices, observers preference for certain present weather codes, and other biases

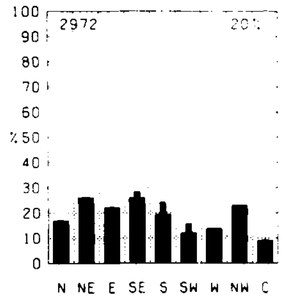
Buhta Providenfiya



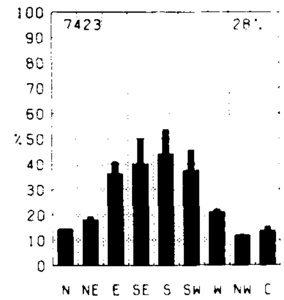
Gambell



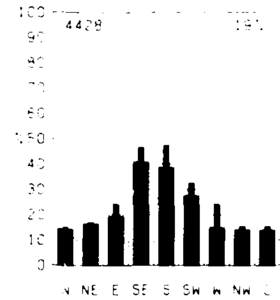
Northeast Cape



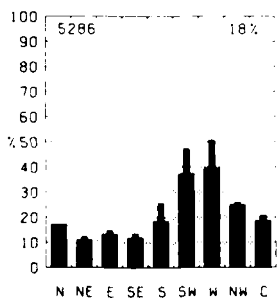
Nome



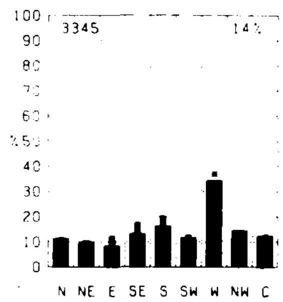
Moses Point



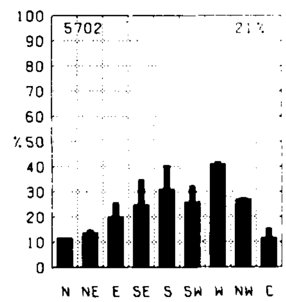
Unalakleet



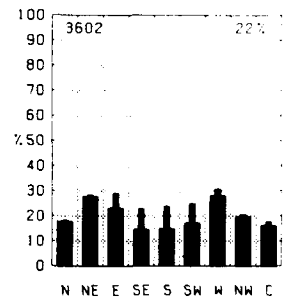
Cape Romanzof



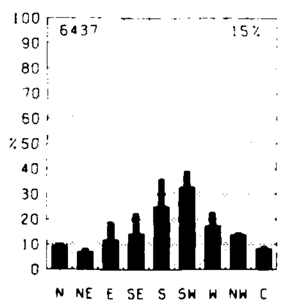
Bethel



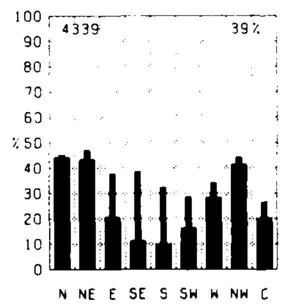
Cape Newenham



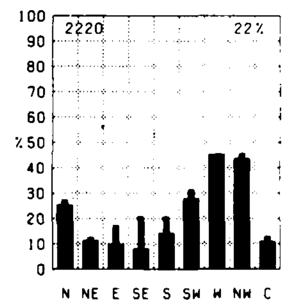
King Salmon



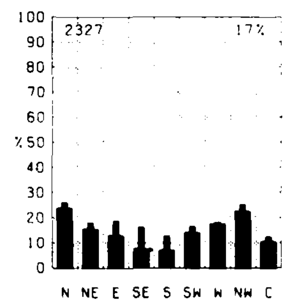
St. Paul

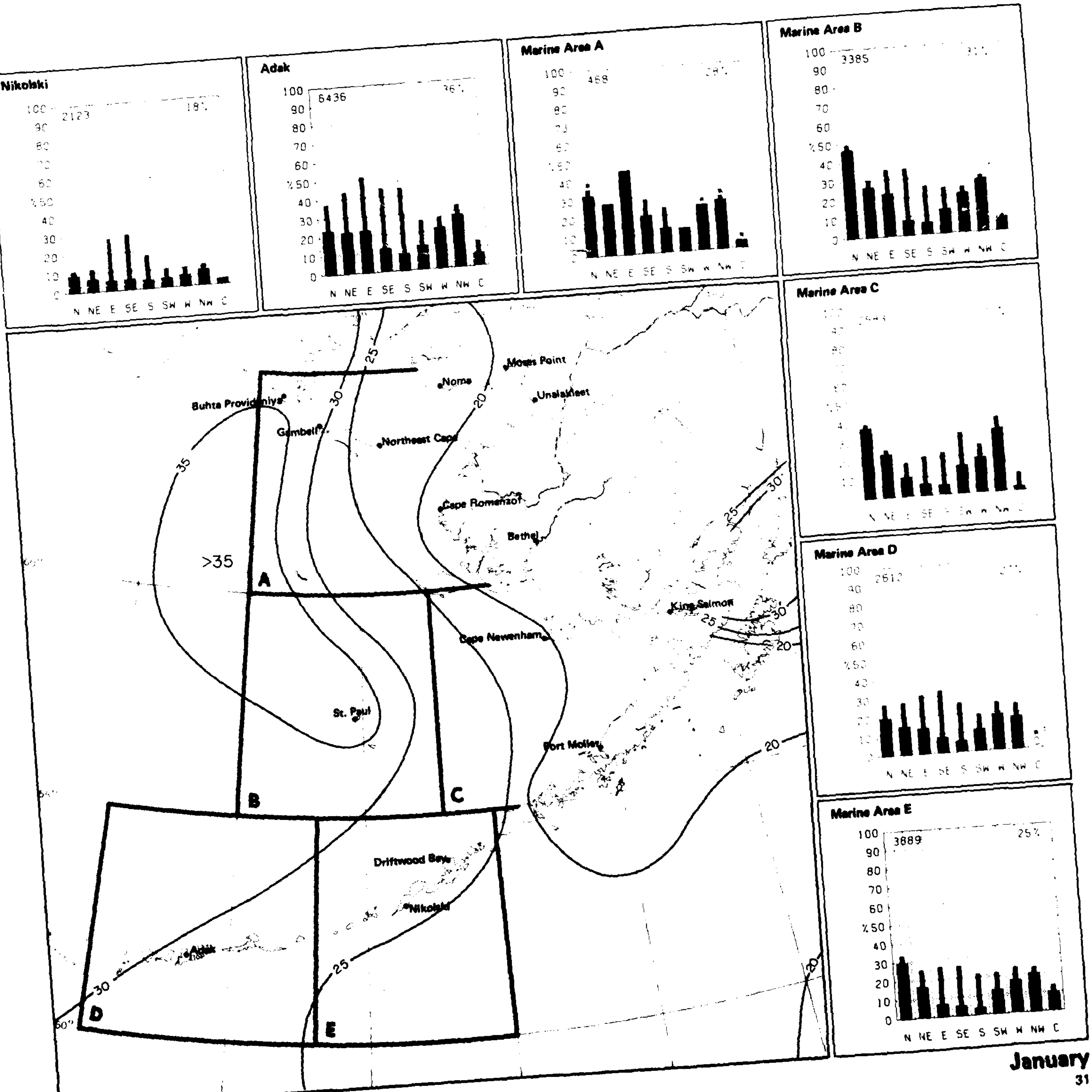


Port Moller



Driftwood Bay



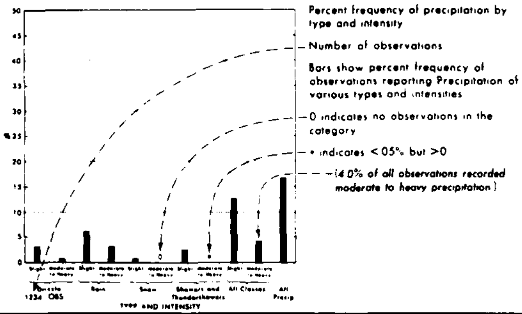


1 Precipitation

January

Legend

Precipitation types

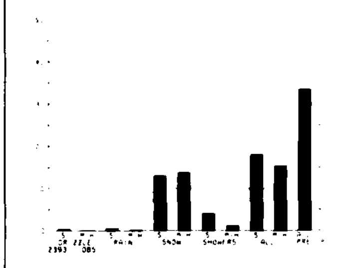


Map - Snow

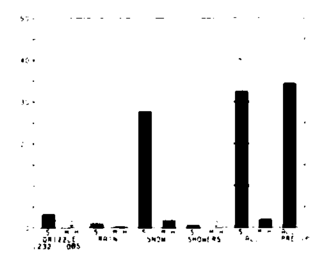
BLACK LINE Percent frequency of precipitation observations reporting snow

The percent frequency of observations reporting snow for a given point can be determined by multiplying the percent frequency of observations reporting precipitation (map 1) with that of precipitation observations reporting snow (map 2)

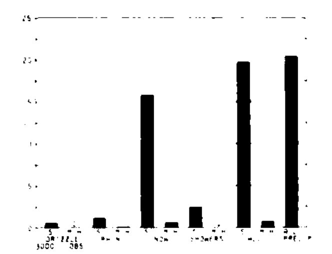
Buhta Provideniya



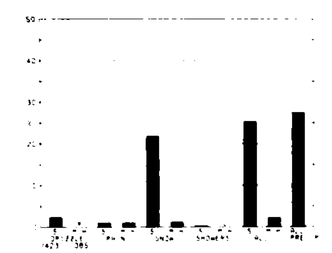
Gambell



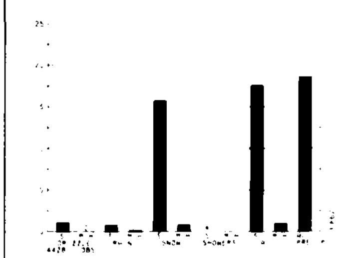
Northeast Cape



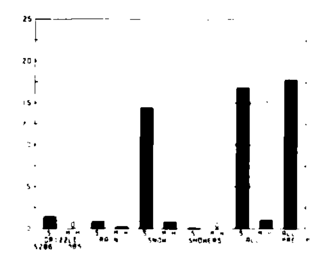
Nome



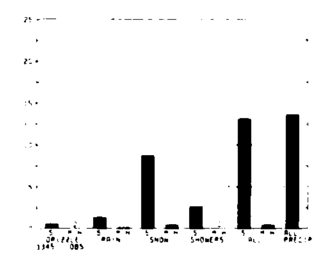
Moses Point



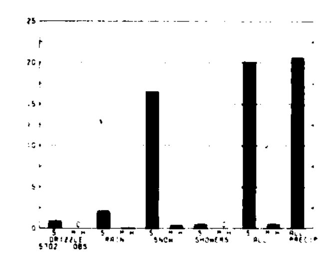
Unalakleet



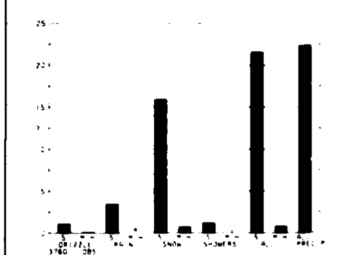
Cape Romanzof



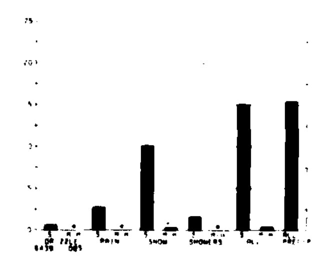
Bethel



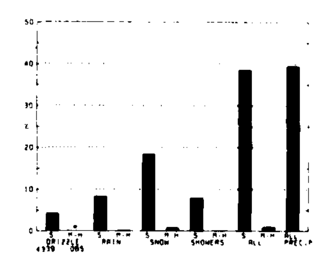
Cape Newenham



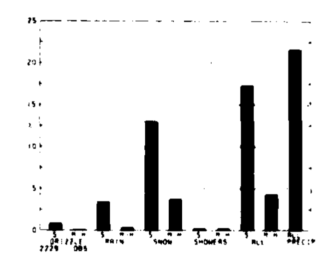
King Salmon



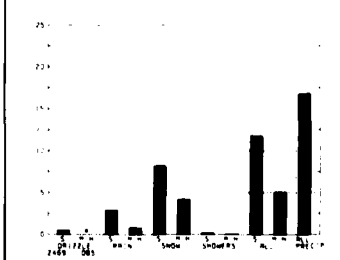
St. Paul



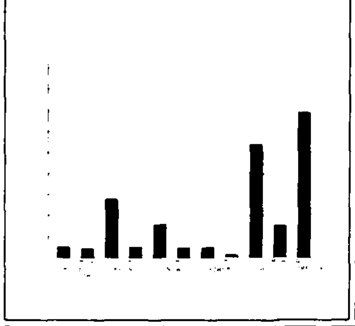
Port Moller



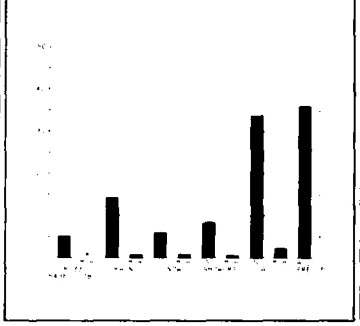
Driftwood Bay



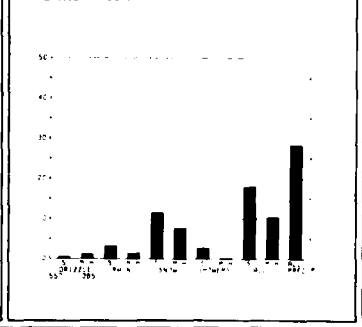
Nikolski



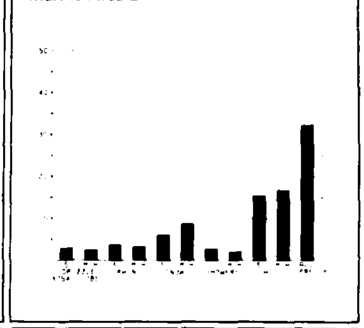
Adak

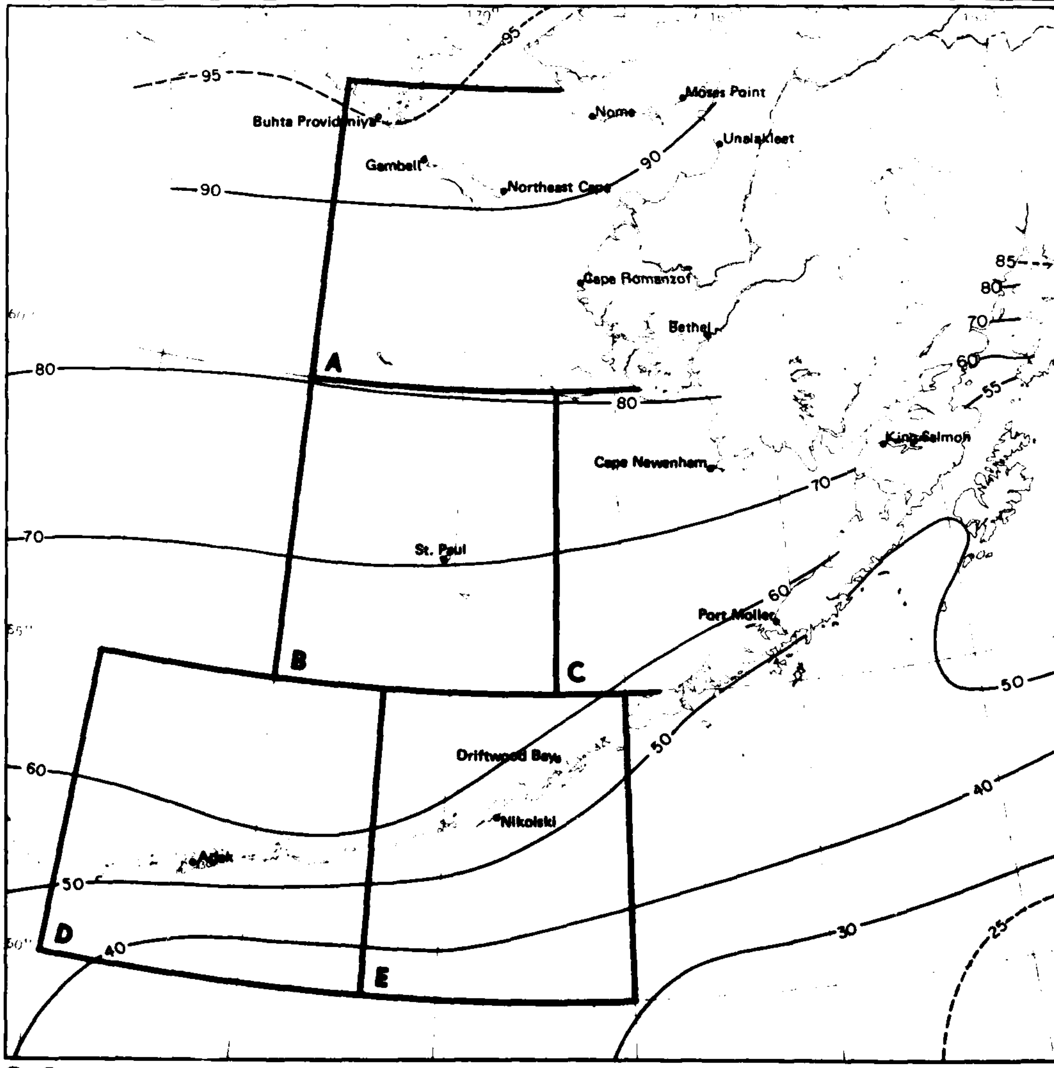


Marine Area A

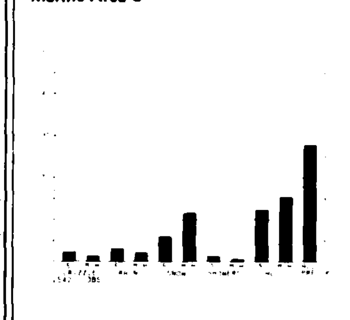


Marine Area B

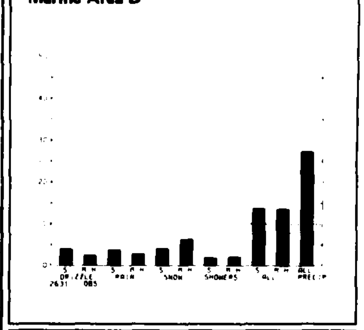




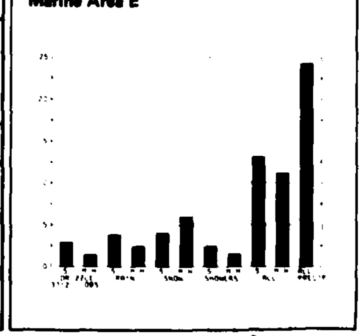
Marine Area C



Marine Area D



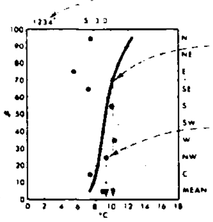
Marine Area E



2 Snow **January**

Legend

Air temperature/wind direction



Number of observations

Cumulative percent frequency of temperatures equal to or less than the temperature intersected by the curve

70% of all temperatures were ≤10.3 °C or ≤50.5 °F

S Standard deviation of temperatures °C

Mean temperature for each wind direction, calm and for all data combined are represented by dots

With NW winds, the mean temperature was 9.4 °C or 48.9 °F

Indicates that the mean temperature for a direction or calm was computed from 10-30 observations

The mean temperature is omitted when less than 10 observations for a direction or calm were available

Map - Air temperature mean and thresholds

BLACK LINE Percent frequency of temperature ≤0°C (≤32°F)

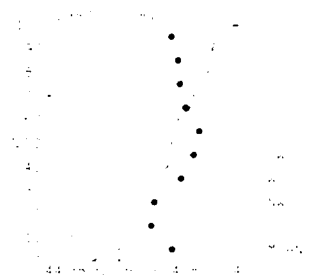
RED LINE Mean air temperature °C

BLUE LINE Percent frequency of wind chill temperature ≤ 30°C (≤ 22°F)

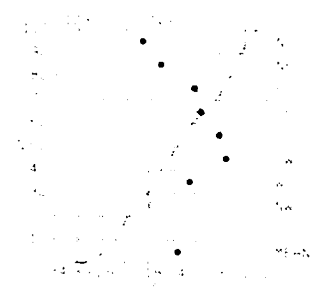
Air temperature readings recorded on transient ships in warm, sunny weather appear biased toward high temperatures, apparently because of improper instrument exposure and ventilation. Despite the inaccuracies, the large-scale patterns and mean gradients of the isopleth analyses are relatively accurate.

The temperature scale of the graph may vary in both range and class interval. The percentage of temperature observations greater than a given value can be obtained by subtracting the cumulative percent frequency of that value from 100%. The number of observations and the standard deviation plus the plotted points on the graphs are based on those observations reporting both temperature and wind direction. The cumulative curve is based on all observations reporting temperature with or without wind direction.

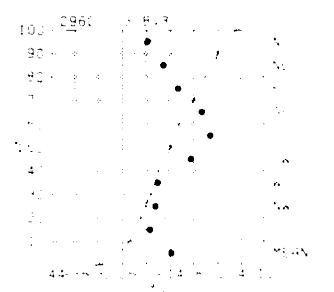
Buhta Provideniya



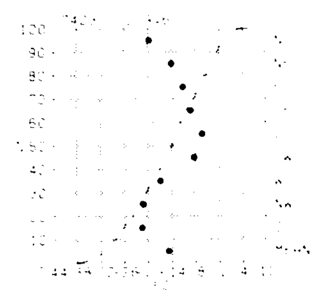
Gambell



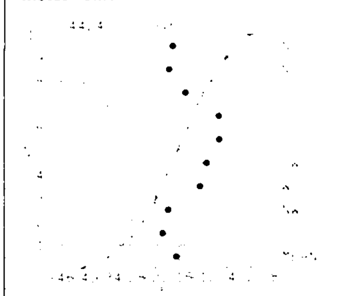
Northeast Cape



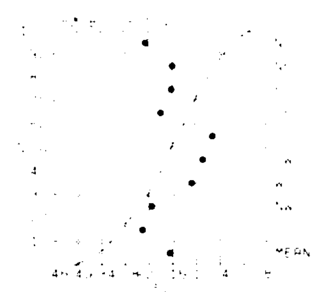
Nome



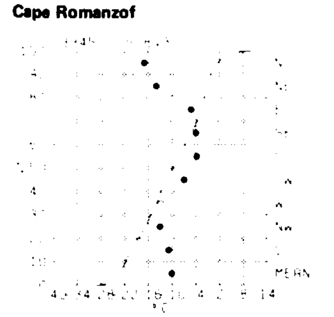
Moses Point



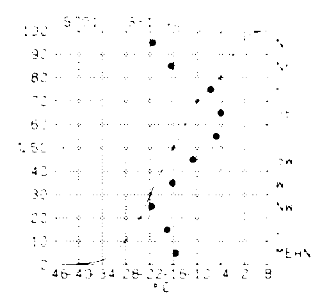
Unalakleet



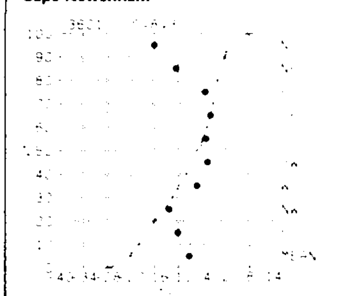
Cape Romanzof



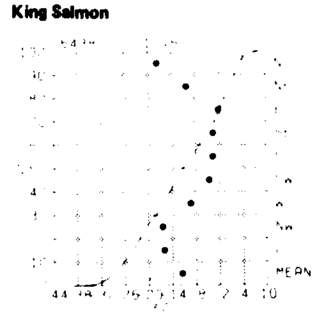
Bethel



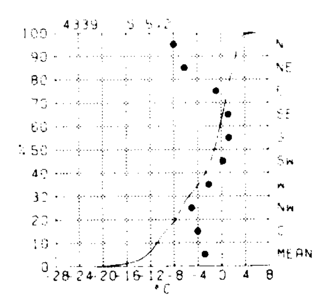
Cape Newenham



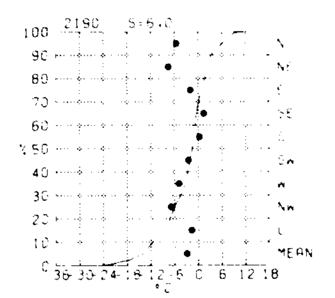
King Salmon



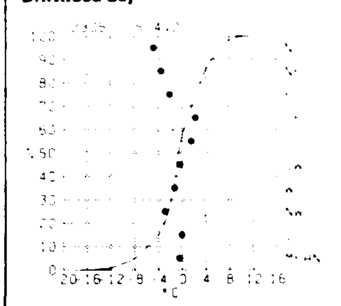
St. Paul

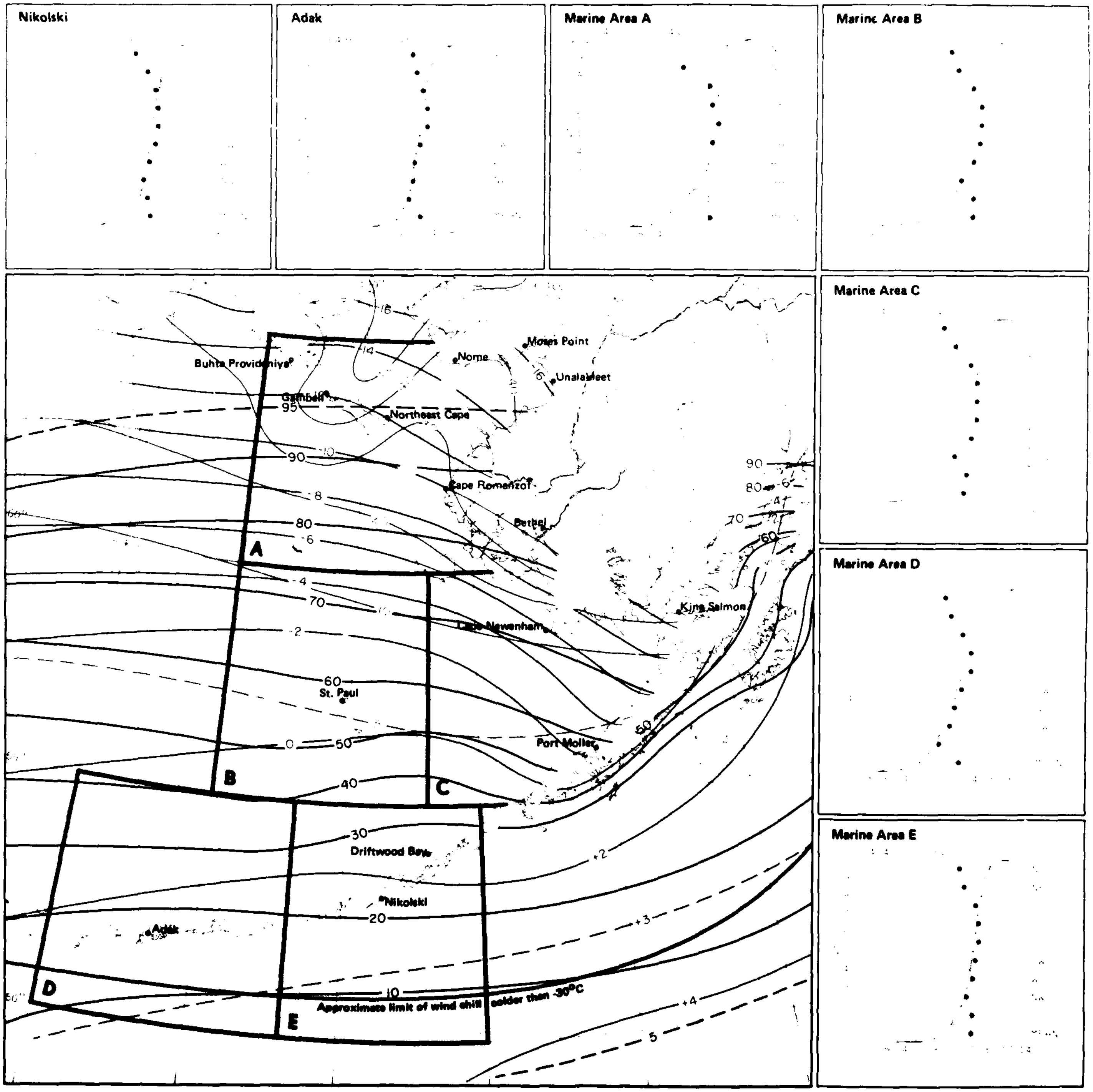


Port Moller



Driftwood Bay



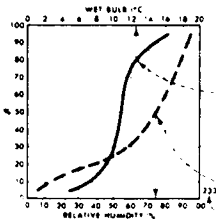


3 Air temperature mean and thresholds

January

Legend

Wet bulb/relative humidity



Cumulative percent frequency of wet bulb temperatures equal to or less than the temperature intersected by the curve (top scale)

Wet bulb °C

80% of all observed wet bulb temperatures were ≤12.5°C or 54.5°F

Cumulative percent frequency of relative humidities equal to or less than the humidity intersected by the curve (bottom scale)

Relative humidity %

50% of all observed relative humidities were ≤74%

Number of observations

Map - Mean dew point temperature

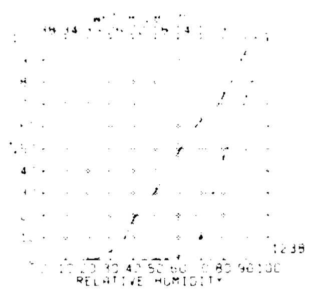
BLACK LINE Mean dew point temperature (°C)

The observation count of the graph reflects those observations reporting both air and wet bulb temperatures, both are required in computing the relative humidity. The percentage of observations of either element greater than a given value can be obtained by subtracting the cumulative percent frequency of that value from 100%.

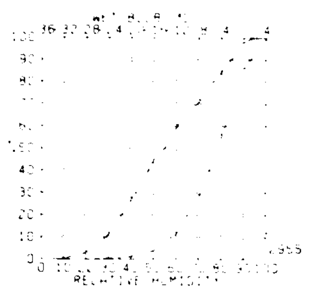
Buhta Provideniya

Insufficient Data

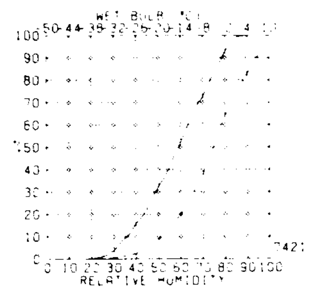
Gambell



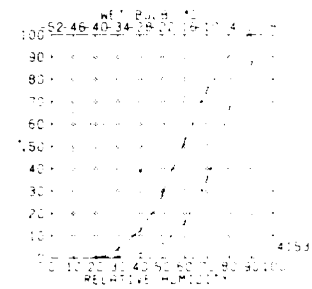
Northeast Cape



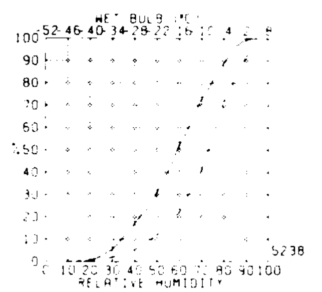
Nome



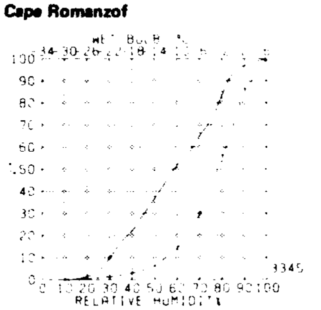
Moses Point



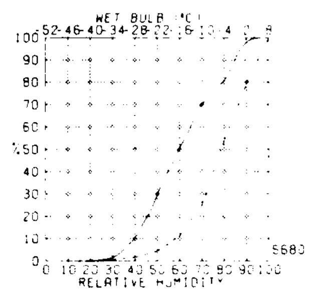
Unalakleet



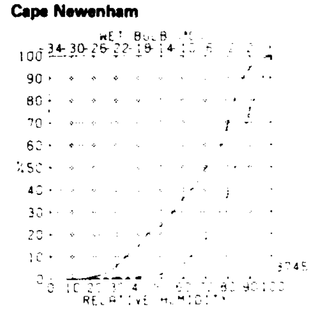
Cape Romanzof



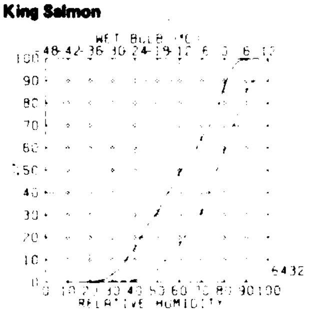
Bethel



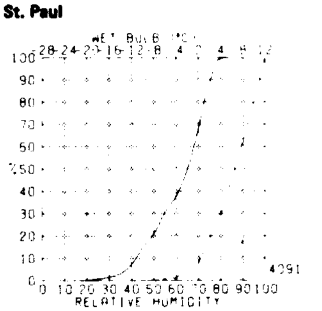
Cape Newenham



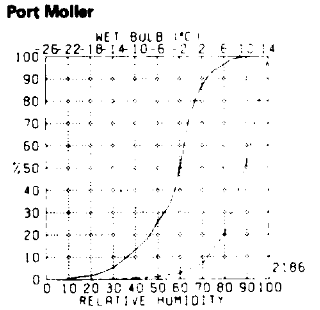
King Salmon



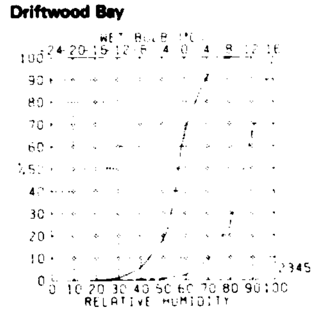
St. Paul

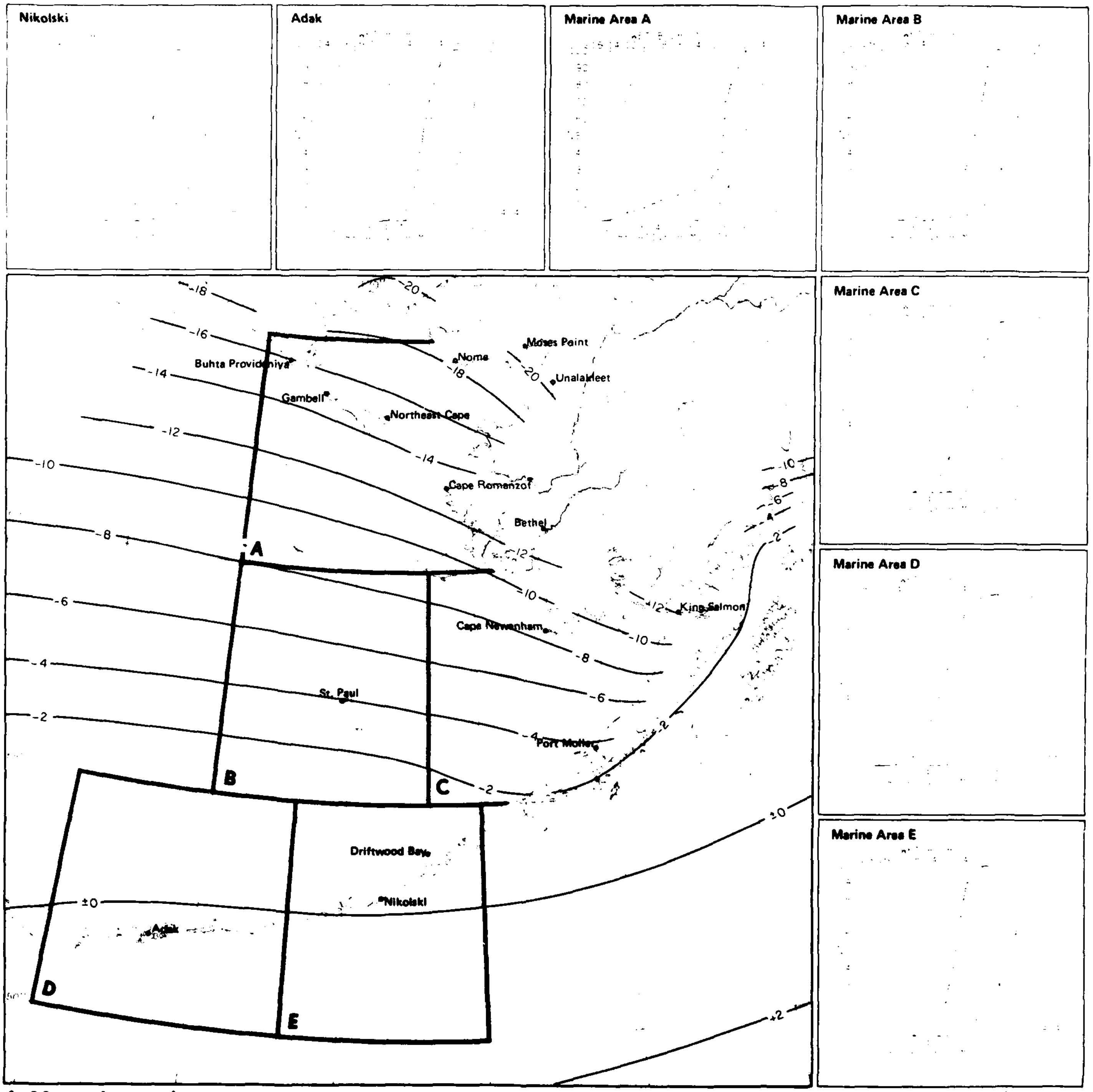


Port Moller



Driftwood Bay





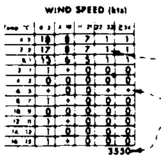
4 Mean dew point temperature

January

Legend

Air temperature/wind speed

WIND SPEED (kts)



Percent frequency of simultaneous occurrence of specified temperature (°C) and wind speed (knots).

(1% of all observations reported temperature 2-3°C simultaneously with wind speed of 22-33 kts

+ Indicates < 5% but >0

Number of observations

Map - Air temperature extremes (°C)

BLACK LINE Maximum (99%) air temperature (1% of temperatures were greater than the given value)

BLUE LINE Minimum (1%) air temperature (1% of temperatures were equal to or less than the given value)

The graph can be used to determine the extent of human discomfort from the combined effects of extreme heat or cold and winds or to estimate the likelihood of superstructure icing. Icing potential increases as the air temperature drops below freezing and the winds increase above 10 knots (12 mph) and may become quite severe with temperatures equal to or less than 9°C (16°F) and winds equal to or greater than 34 knots (39 mph)

Buhta Providenya

[illegible]

Gambell

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
0.1	0	0	+	1	+
-2.-1	+	2	4	2	+
-4.-3	1	3	5	3	+
-6.-5	+	2	3	2	1
-8.-7	+	1	3	2	+
-10.-9	0	+	2	2	1
-12.-11	0	1	2	4	1
-14.-13	+	1	3	3	1
-16.-15	+	1	3	4	+
-18.-17	+	+	2	5	1
≤-19	1	5	11	9	2

1237

Northeast Cape

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
2.3	0	+	+	1	+
0.1	+	+	1	2	+
-2.-1	+	1	3	2	+
-4.-3	1	1	3	1	+
-6.-5	1	2	3	+	+
-8.-7	1	2	3	1	+
-10.-9	1	1	3	1	+
-12.-11	1	2	4	+	+
-14.-13	2	3	3	1	+
-16.-15	1	1	3	1	+
≤-17	14	14	10	2	+

2960

Nome

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
6.7	0	0	0	+	0
4.5	0	0	+	+	0
2.3	0	+	1	+	0
0.1	+	1	2	+	+
-2.-1	+	1	3	1	+
-4.-3	+	2	4	1	+
-6.-5	1	2	2	1	+
-8.-7	1	2	3	1	+
-10.-9	1	2	2	1	+
-12.-11	1	2	3	1	+
≤-13	21	20	12	3	+

7423

Moses Point

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
4.5	0	+	0	0	[illegible]
2.3	+	+	+	0	0
0.1	+	1	1	+	+
-2.-1	+	1	2	1	+
-4.-3	+	2	2	+	0
-6.-5	1	2	2	+	+
-8.-7	1	2	3	+	0
-10.-9	1	1	2	+	+
-12.-11	1	2	4	1	0
-14.-13	1	2	5	1	0
≤-15	11	19	19	7	+

4402

Unalakleet

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
8.9	0	+	0	0	0
6.7	0	0	+	+	0
4.5	0	+	+	+	0
2.3	0	+	1	+	0
0.1	0	+	1	+	0
-2.-1	+	1	3	1	+
-4.-3	+	1	2	1	+
-6.-5	+	1	2	1	+
-8.-7	+	1	2	2	+
-10.-9	+	1	3	2	+
≤-11	9	27	21	12	1

5253

Cape Romanzof

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
8.9	+	+	+	0	0
6.7	+	+	1	+	0
4.5	+	+	1	0	0
2.3	+	1	2	+	0
0.1	+	1	4	1	+
-2.-1	1	2	6	2	+
-4.-3	2	2	4	2	+
-6.-5	1	1	2	1	+
-8.-7	2	2	3	1	+
-10.-9	2	1	1	1	+
≤-11	10	8	14	12	3

3345

Bethel

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
8.9	0	0	+	0	0
6.7	0	+	+	0	0
4.5	0	+	1	+	0
2.3	+	1	2	+	+
0.1	+	2	2	+	+
-2.-1	+	3	3	1	+
-4.-3	+	2	2	+	0
-6.-5	+	1	1	+	0
-8.-7	1	2	1	+	0
-10.-9	+	2	1	+	+
≤-11	8	27	30	3	+

5692

Cape Newenham

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
10.11	0	0	0	+	0
8.9	0	+	+	+	+
6.7	0	+	1	1	+
4.5	+	+	1	1	+
2.3	+	1	4	3	+
0.1	1	3	6	1	+
-2.-1	2	4	6	2	+
-4.-3	3	3	3	1	+
-6.-5	2	1	1	1	+
-8.-7	3	2	2	1	+
≤-9	15	12	10	2	+

3601

King Salmon

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
12.13	0	+	0	0	0
10.11	0	0	0	0	0
8.9	0	+	+	+	0
6.7	0	+	1	+	+
4.5	+	1	1	1	+
2.3	+	2	4	2	+
0.1	+	3	3	1	+
-2.-1	1	4	3	1	+
-4.-3	1	4	2	+	0
-6.-5	1	3	1	+	0
≤-7	17	28	15	2	+

6438

St. Paul

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
6.7	0	0	0	+	+
4.5	0	+	1	1	+
2.3	+	3	12	7	1
0.1	1	4	9	5	1
-2.-1	1	3	6	4	1
-4.-3	+	2	4	2	+
-6.-5	1	1	2	1	+
-8.-7	+	2	4	3	+
-10.-9	+	1	3	2	+
-12.-11	+	1	3	2	+
≤-13	+	1	2	2	+

4339

Port Moller

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
12.13	0	+	0	0	0
10.11	0	+	+	0	0
8.9	+	1	1	+	0
6.7	1	2	1	+	0
4.5	1	2	1	0	0
2.3	2	5	4	1	+
0.1	3	6	3	1	0
-2.-1	7	12	3	+	0
-4.-3	4	6	1	+	0
-6.-5	2	3	2	0	0
≤-7	2	13	8	1	0

2190

Driftwood Bay

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
10.11	+	+	+	0	0
8.9	+	1	1	+	0
6.7	1	3	3	+	0
4.5	1	3	3	+	+
2.3	2	6	5	1	+
0.1	6	8	5	+	+
-2.-1	6	13	6	+	0
-4.-3	2	6	3	+	0
-6.-5	1	2	2	+	0
-8.-7	1	2	2	+	0
≤-9	+	1	3	+	0

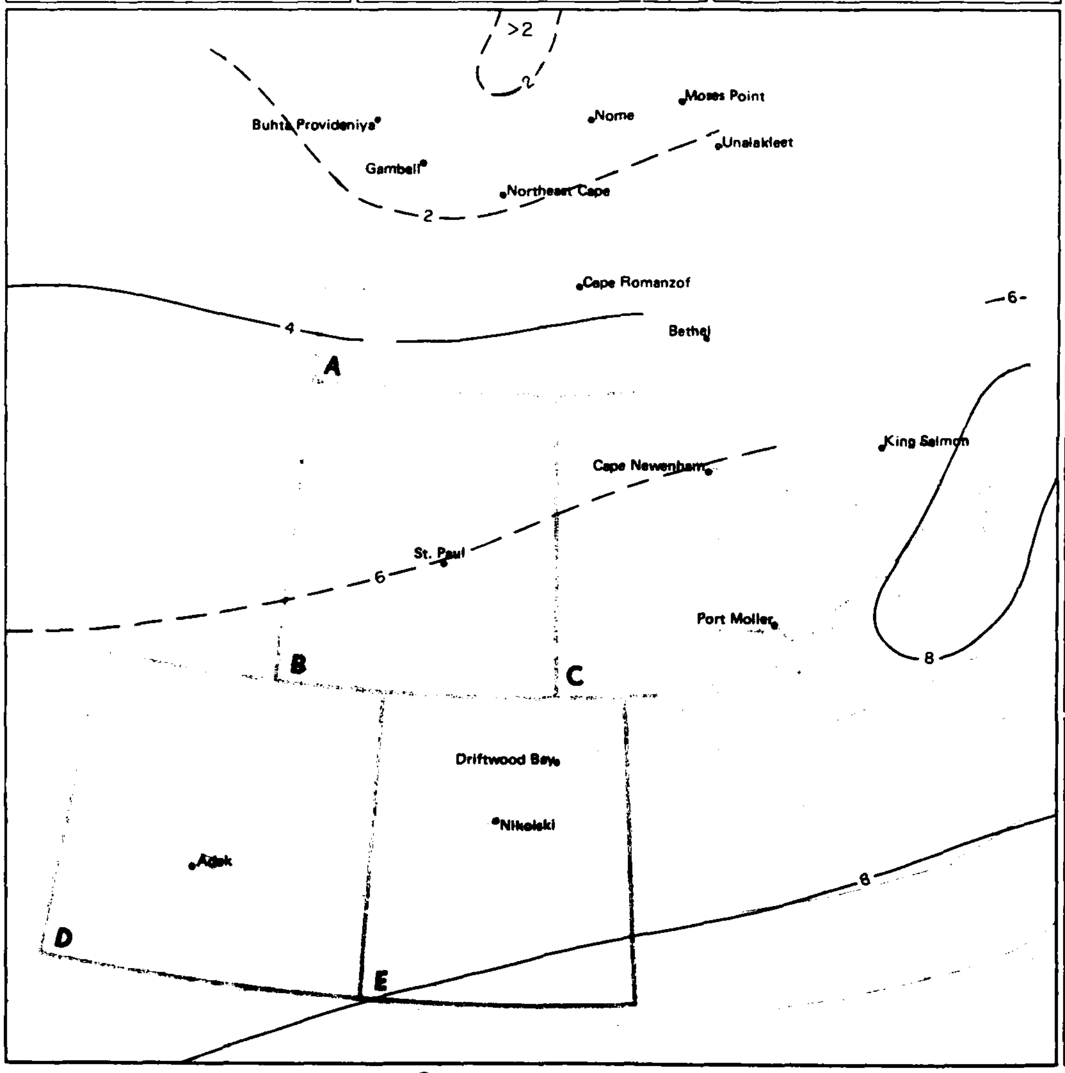
2305

Nikolski

Adak

Marine Area A

Marine Area B



Marine Area C

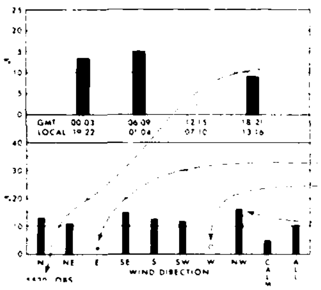
Marine Area D

Marine Area E

5 Air temperature extremes (^{o}C)

January

Legend **Fog/time and fog/wind direction**



Number of observations

Bar graphs represent percent frequency of Fog without precipitation for various hour groupings and wind directions. Data are based on 100% for each hour group and direction category

• indicates < .05 but > 0

0 indicates no fog occurred with the wind direction

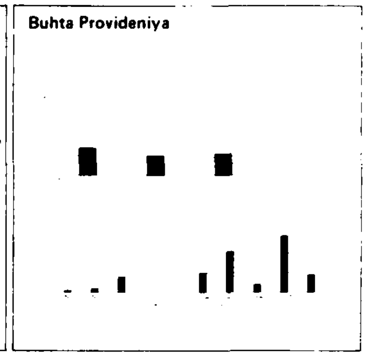
Data show that 17% of all NW winds were accompanied by Fog without precipitation

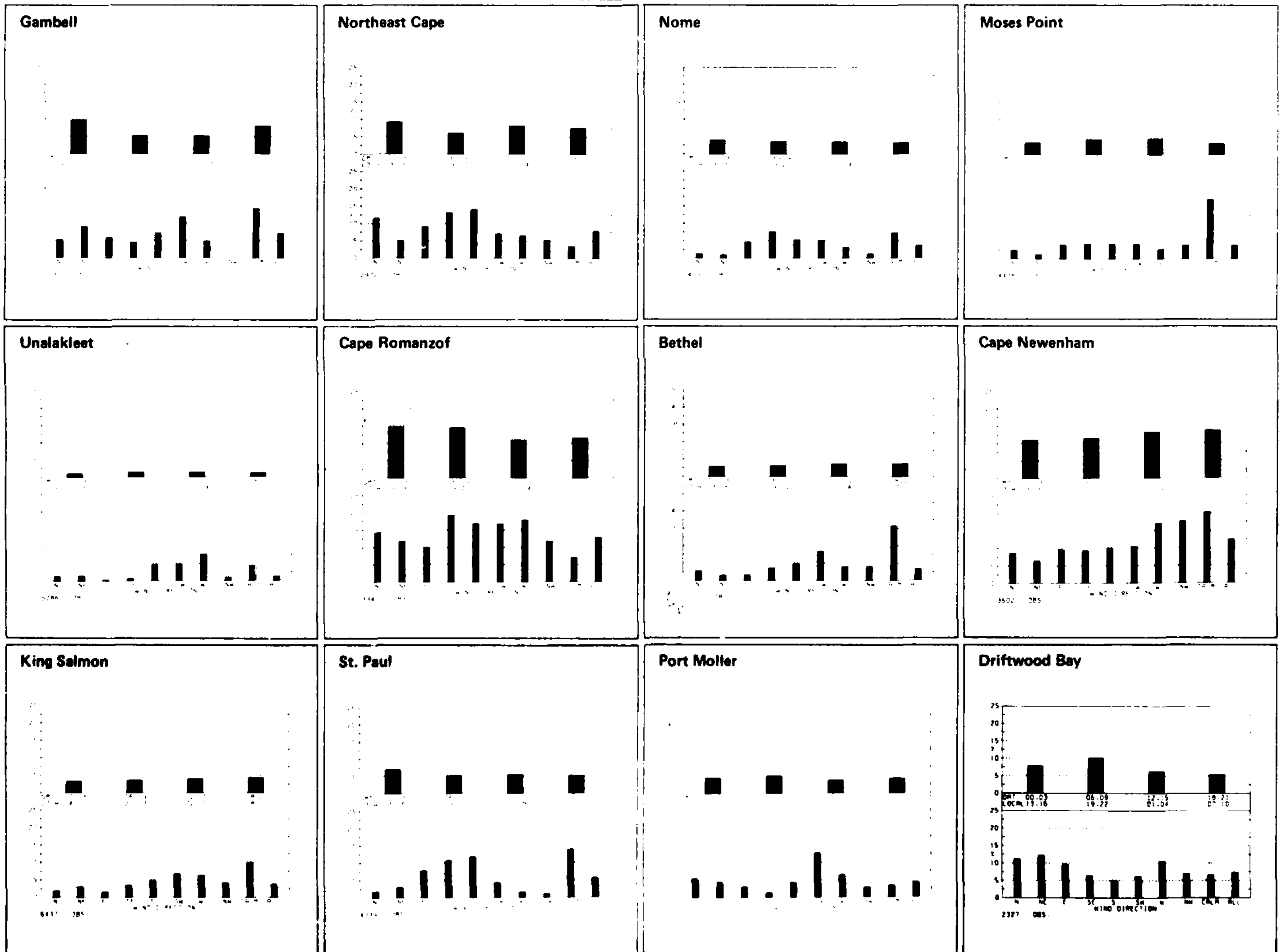
Map · Fog

BLACK LINE Percent frequency of occurrence of all fog

BLUE LINE Percent frequency of fog occurring without precipitation

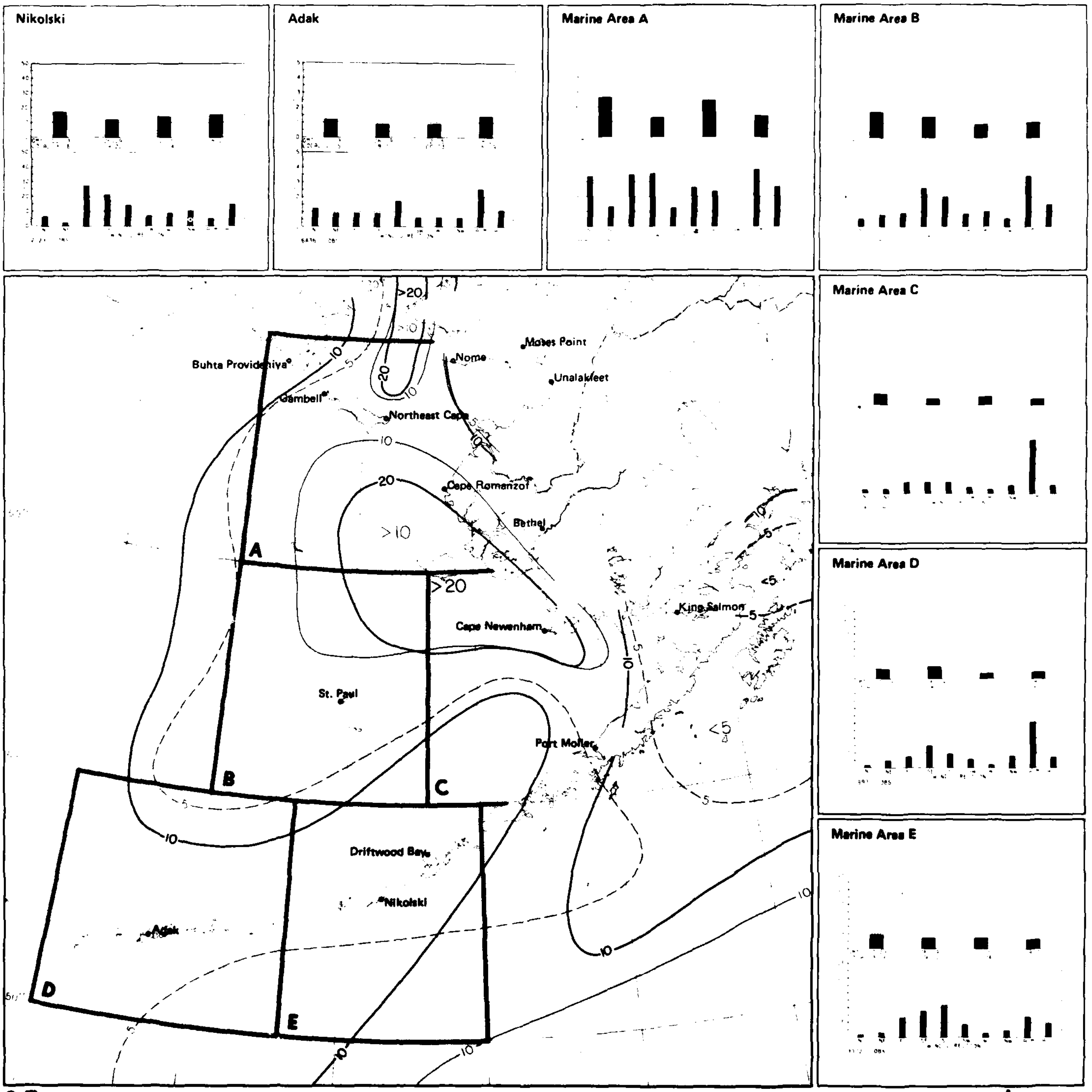
The percent frequency of observations reporting fog with precipitation for a given point can be determined by computing the difference between the two analyses





January

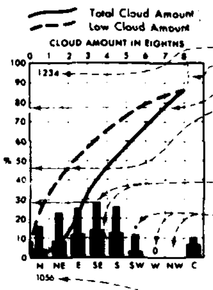
6 Fog/time and fog/wind direction



6 Fog **January**

Legend

Cloud cover/wind direction



Cumulative percent frequency of indicated cloud amount equal to or less than the amount intersected by the curve

Number of total cloud observations

Obscurations

(77% of all total cloud amounts were ≤7/8.)

(46% of all low cloud amounts were ≤2/8.)

Low cloud amount: Percent frequency of observations from each direction and calm that were accompanied by low cloud amounts ≥5/8 and ≥7/8. Low clouds are clouds with bases <8000 feet

(28% of all SE winds were accompanied by low cloud amounts ≥5/8 and 14% by low cloud amounts ≥7/8.)

An asterisk indicates that the percentage is based on 10-30 observations of wind direction, total and low cloud amount. 0 replaces bar graph when no low cloud amounts ≥5/8 were observed with a wind direction or calm. 0 or bar is omitted when number of observations of total and low cloud amount from a wind direction or calm is less than 10

Number of low cloud observations

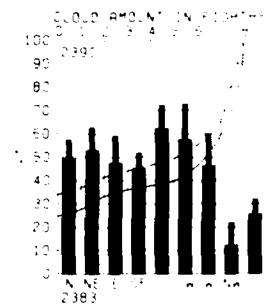
Map - Cloud amount thresholds

BLACK LINE Percent frequency of total cloud amount ≤2/8

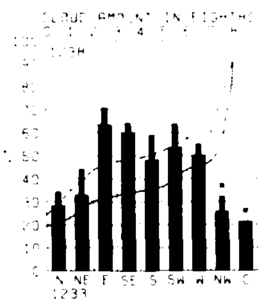
BLUE LINE Percent frequency of low cloud amount ≥5/8

Since the number of observations reporting low cloud amount is usually less than that for total cloud amount, somewhat different samples may be used to compute the two curves on the graph. This may lead to inconsistencies where low cloud amount appears higher than the total cloud amount. Where this occurred the graph was adjusted in favor of the total cloud by making the curves coincide. The frequency of obscured conditions may be determined by subtracting the cumulative percent frequency corresponding to 8/8 coverage from 100%. In computing the bar graph, obscurations are considered as 8/8 coverage.

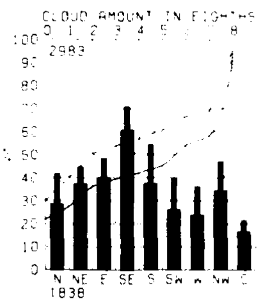
Buhta Provideniya



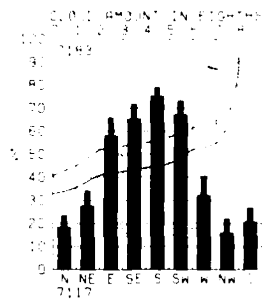
Gambell



Northeast Cape

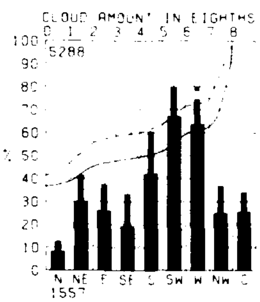


Nome

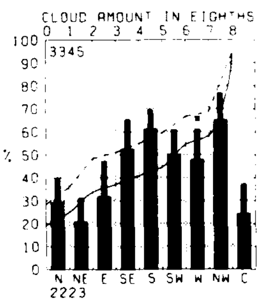


Moses Point

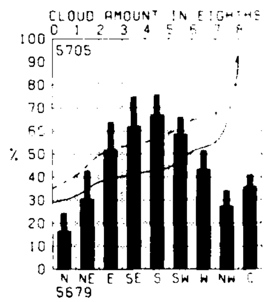
Unalakleet



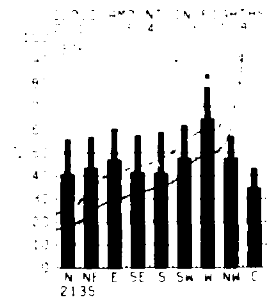
Cape Romanzof



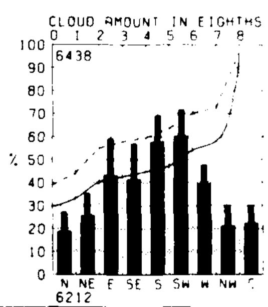
Bethel



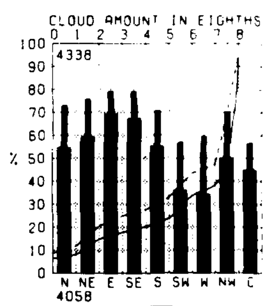
Cape Newenham



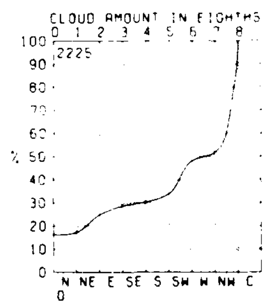
King Salmon



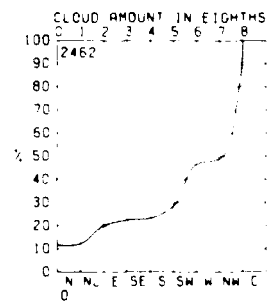
St. Paul

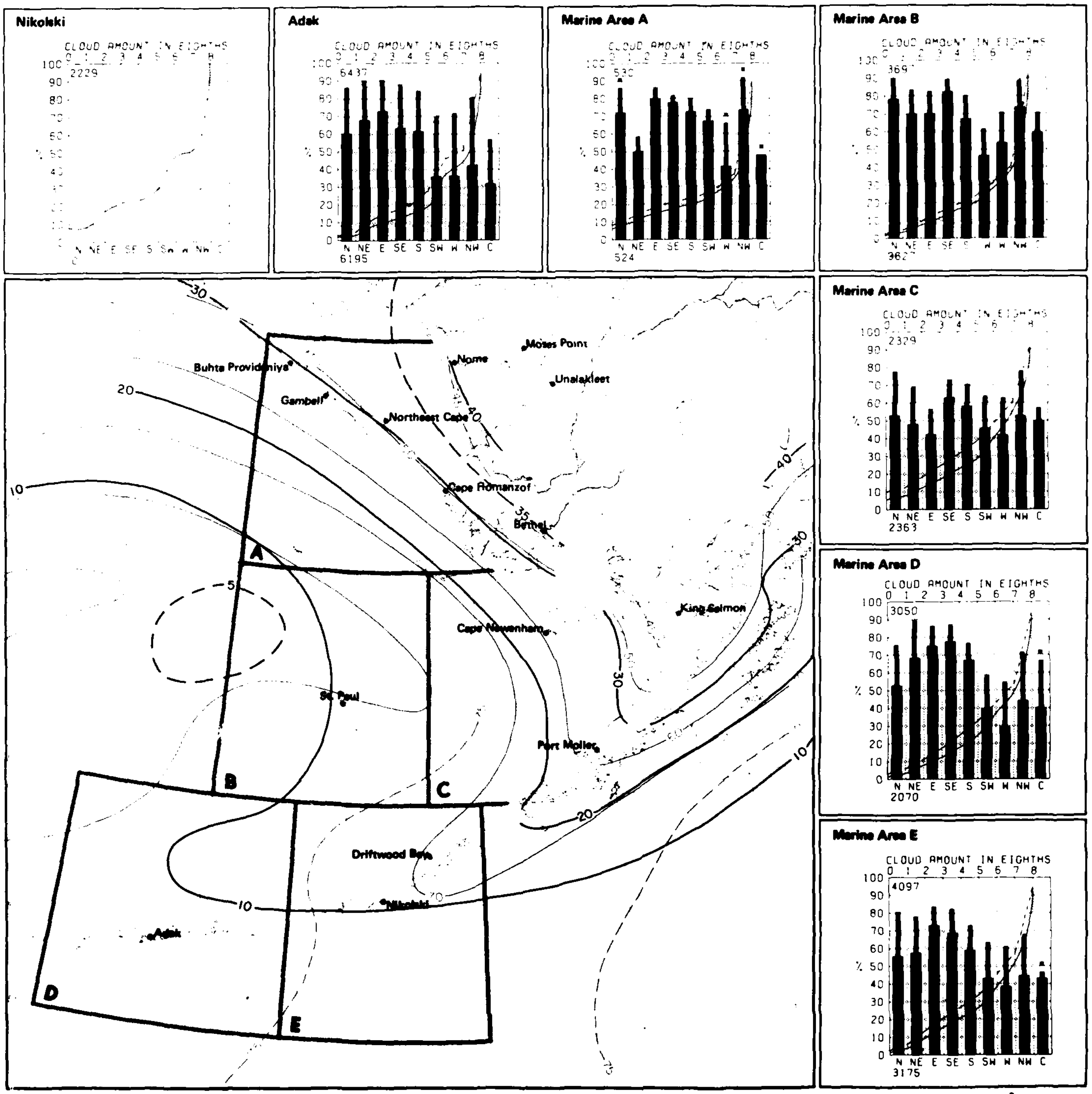


Port Moller



Driftwood Bay



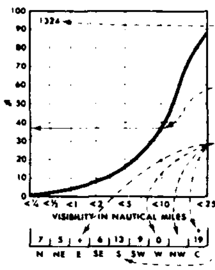


7 Cloud amount thresholds

January

Legend

Visibility/wind direction



Number of observations

Cumulative percent frequency of visibilities less than the visibility intersected by the curve

(37% of all visibilities reported were <10 nautical miles.)

The table below the graph indicates percent frequency of occurrence of visibility <2 nautical miles versus wind direction

• indicates < 5% but >0. 0 indicates that no visibilities <2 nautical miles were observed with winds from a direction or calm. No percentage is given if less than 10 observations were available for visibility and wind direction. An asterisk indicates that the percentage was based on 10-30 observations of visibility and wind direction

(13% of all S winds were accompanied by visibilities <2 nautical miles.)

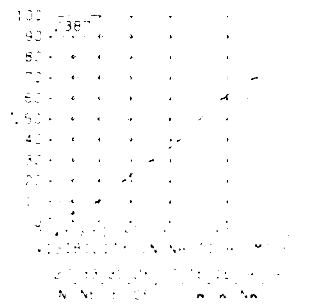
Map - Visibility thresholds

BLACK LINE Percent frequency of visibilities ≥5 nautical miles

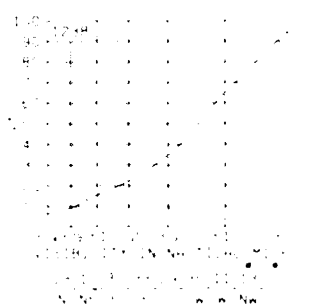
BLUE LINE Percent frequency of visibilities <2 nautical miles

The percentage of visibility equal to or greater than a given value can be obtained from the graph by subtracting the cumulative percent frequency of that value from 100%. Visibility at sea is difficult to measure because of the lack of reference points. Also, some observers seem to report reduced visibilities at night because of darkness, though this tendency has abated in recent years. The coarseness of the coding intervals, however, tends to minimize serious biases in the summarized data. Visibilities greater than 25 nmi should be interpreted cautiously because the earth's curvature makes it impossible to see 25 nmi horizontally from the bridges of most ships.

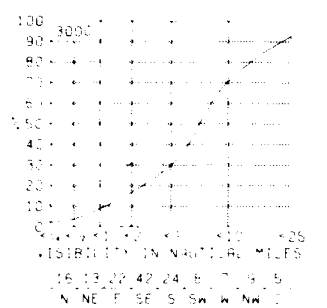
Buhta Provideniya



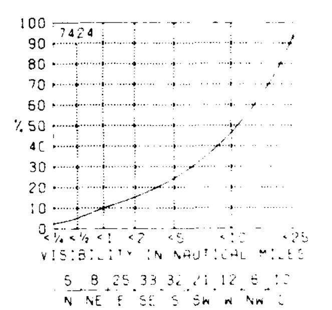
Gambell



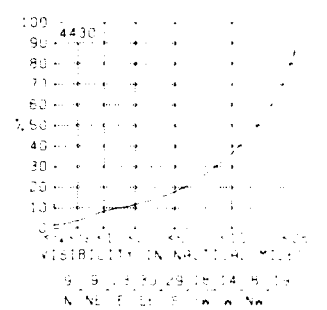
Northeast Cape



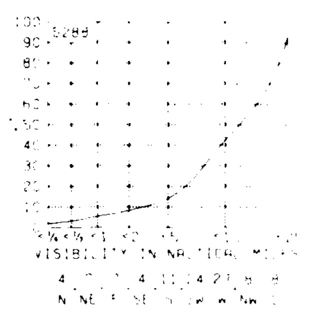
Nome



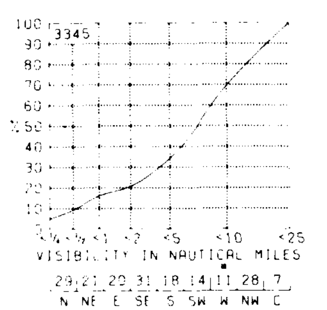
Moses Point



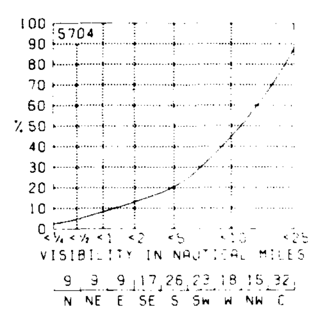
Unalakleet



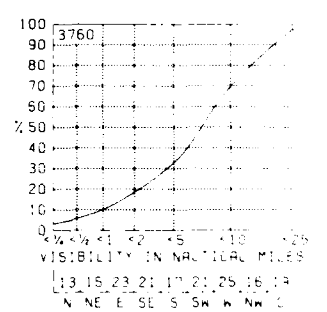
Cape Romanzof



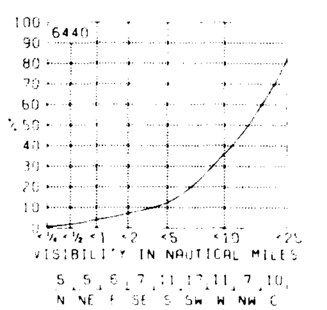
Bethel



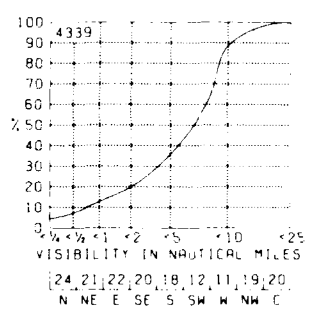
Cape Newenham



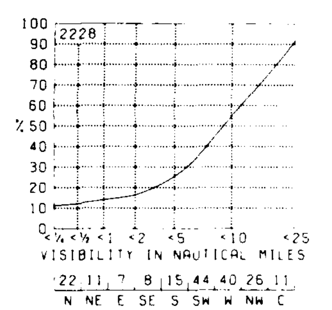
King Salmon



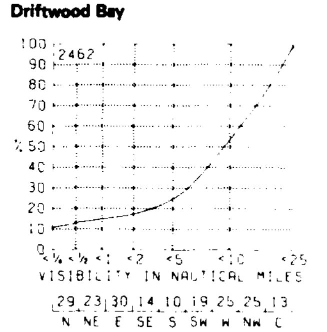
St. Paul

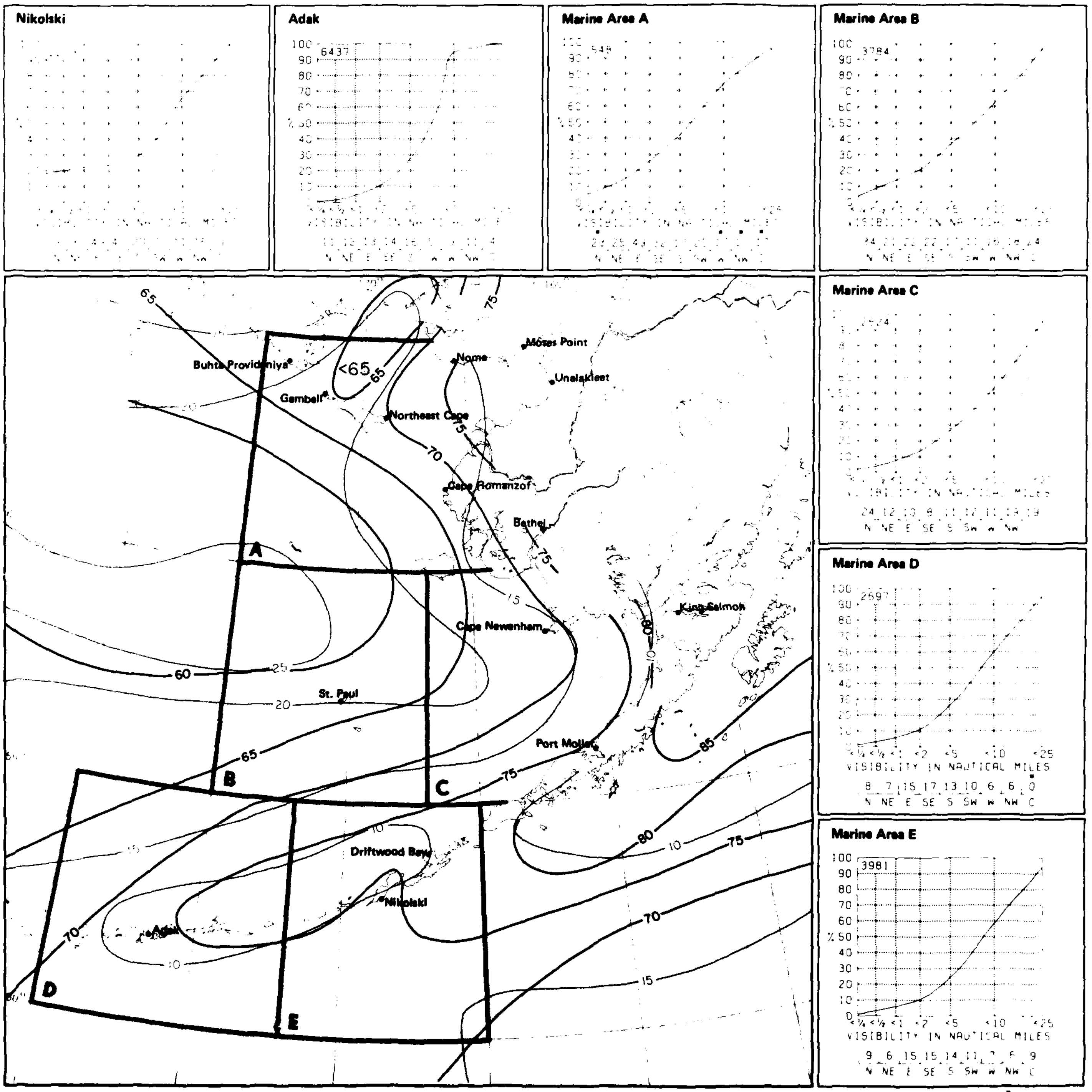


Port Moller



Driftwood Bay



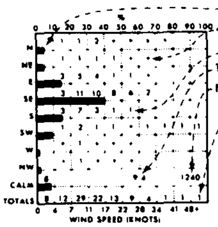


8 Visibility thresholds **January**

Legend

Wind speed/direction

Direction frequency (top scale). Bars represent percent frequency of winds observed from each direction. Speed frequency (bottom scale). Printed figures represent percent frequency of wind speeds observed from each direction.



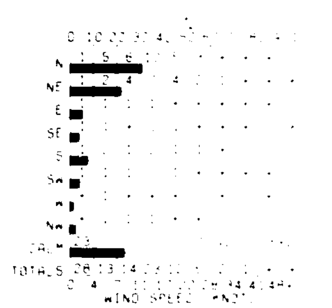
Map - Wind speed thresholds

BLACK LINE - Percent frequency of wind speed ≤10 knots (≤12 mph)

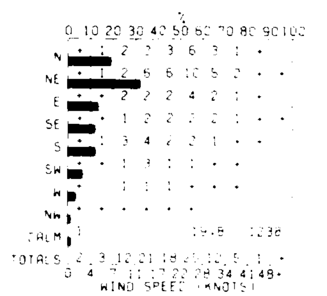
BLUE LINE - Percent frequency of wind speed ≥34 knots (≥39 mph)

The scalar mean wind speed on the graph is based on the number of observations reporting a wind speed with direction. The sum of the totals line provides the cumulative percent frequency of wind speed below a selected threshold value. In the example graph, 71% of all winds were less than 17 knots (20 mph).

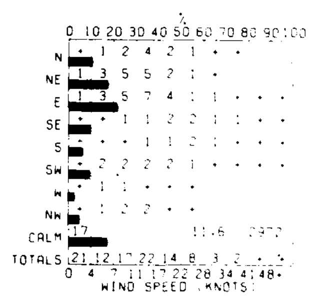
Buhta Provideniya



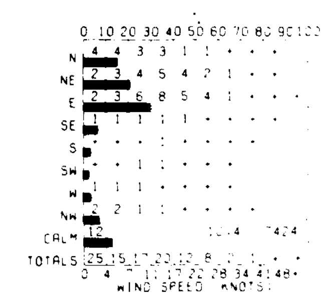
Gambell



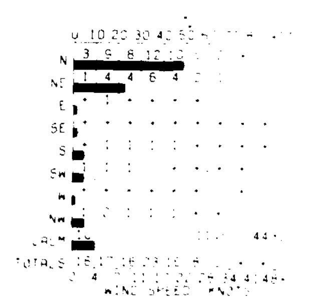
Northeast Cape



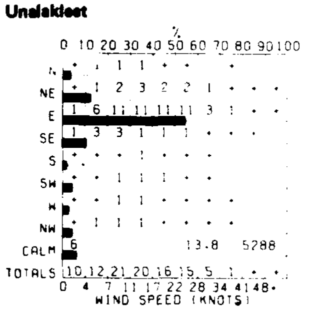
Nome



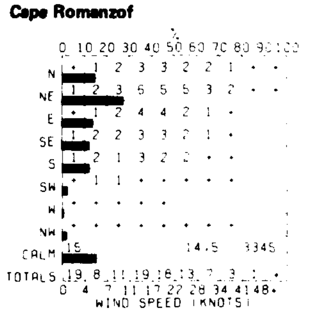
Moses Point



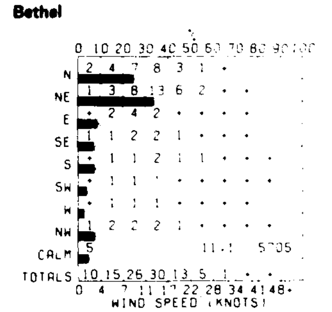
Unalakleet



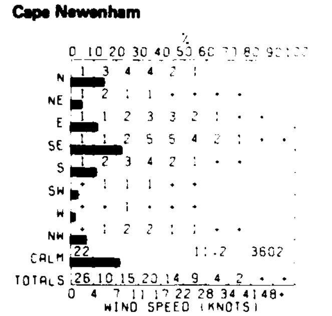
Cape Romanzof



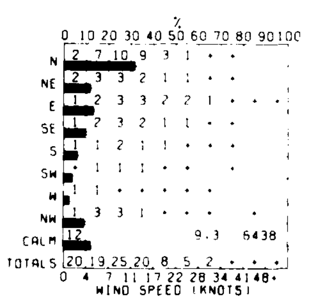
Bethel



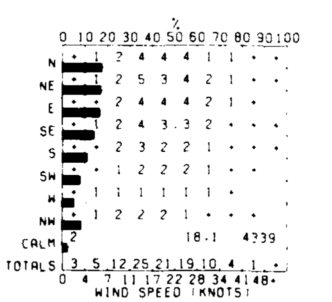
Cape Newenham



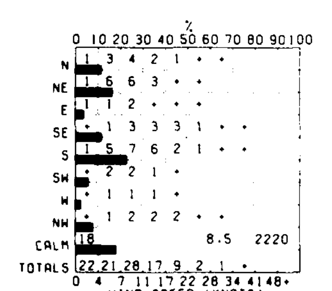
King Salmon



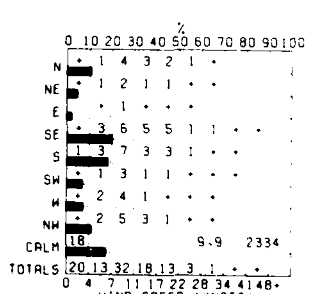
St. Paul

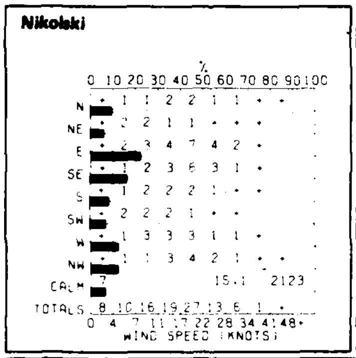


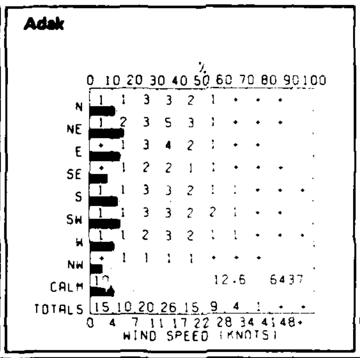
Port Moller

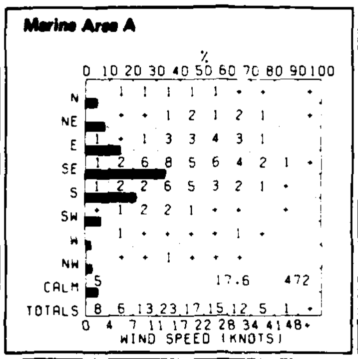


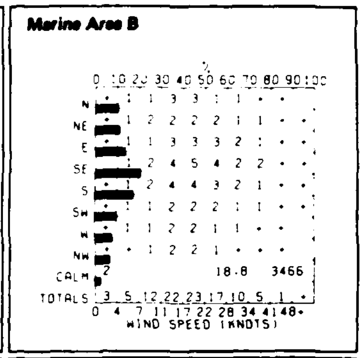
Driftwood Bay

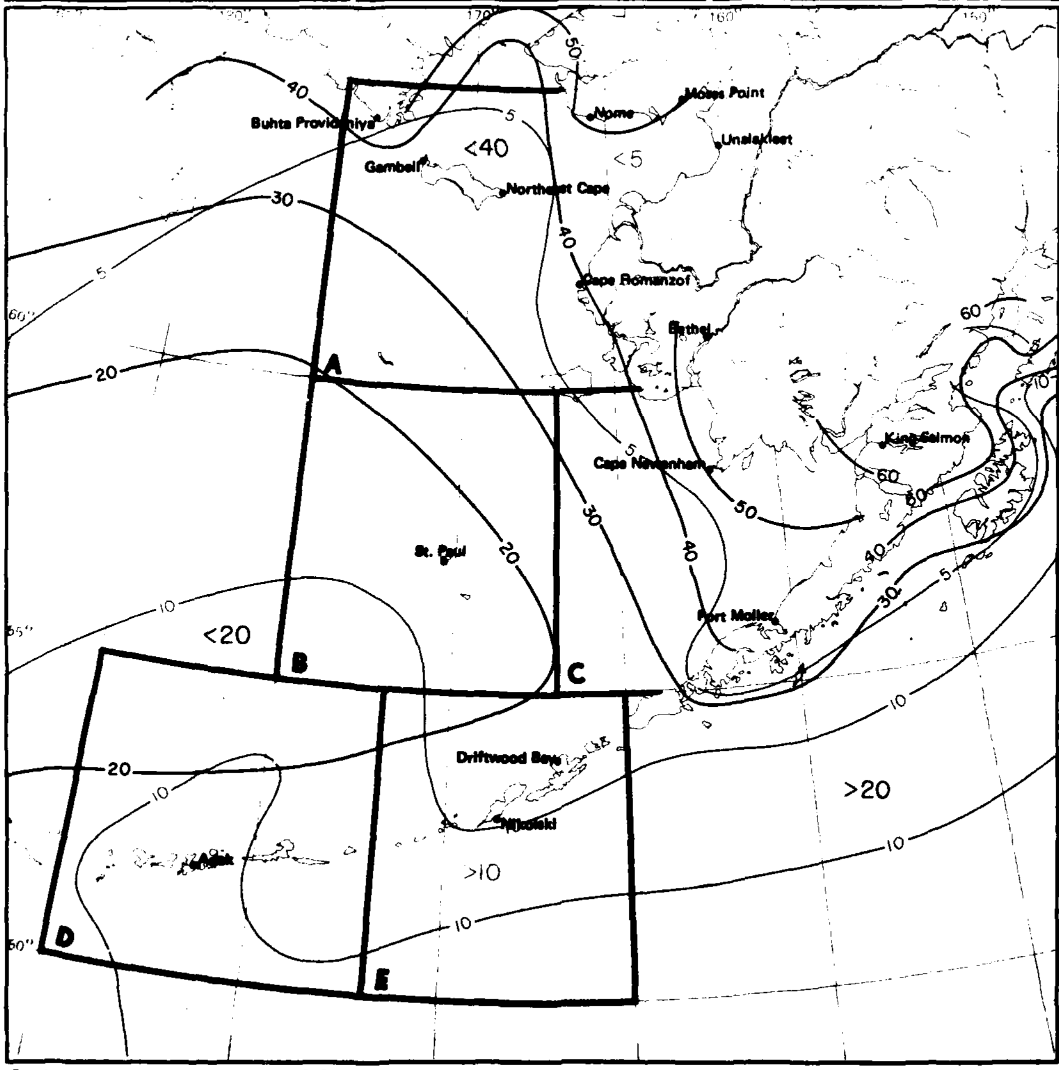


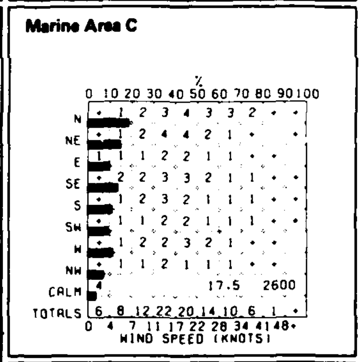


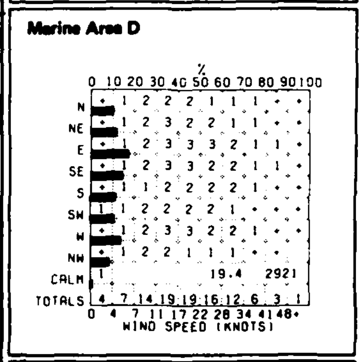


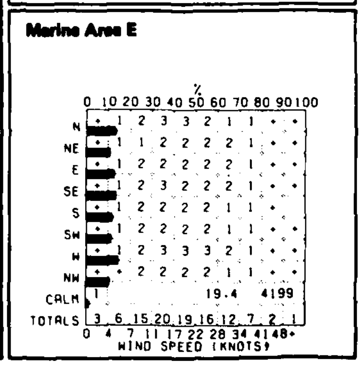






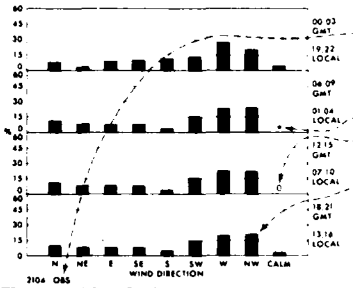






9 Wind speed thresholds

Legend — Wind direction/diurnal variation



Number of observations

Bars show percent frequency of wind direction (8 pts) by hour (GMT and Local Time) Data are based on 100% for each hour group

* indicates < 05% but >0

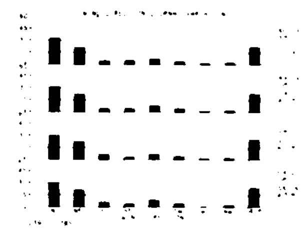
0 indicates no observations in the category

(22% of the wind observations for the hours 18 and 21 GMT (13 and 16 Local Time) had a direction from the northwest)

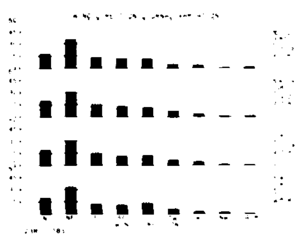
Map - Vector mean wind

10 2 Direction of flow toward station dot, vector magnitude in knots (example vector mean wind is from northeast at 10 2 knots or 11 7 mph)

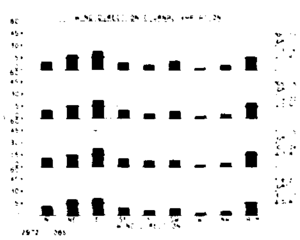
Buhta Provideniya



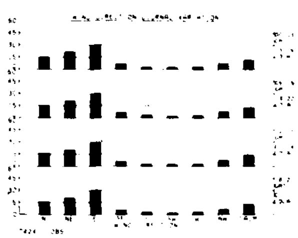
Gambell



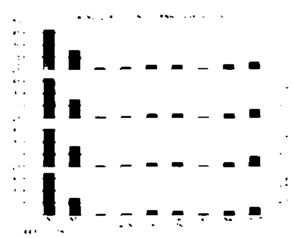
Northeast Cape



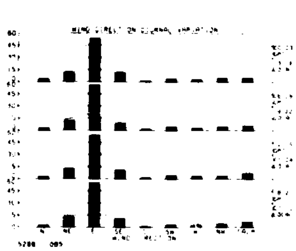
Nome



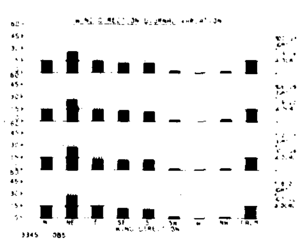
Moses Point



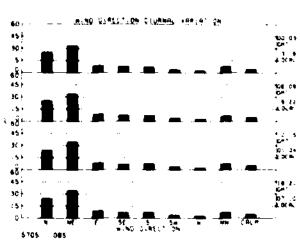
Unalakleet



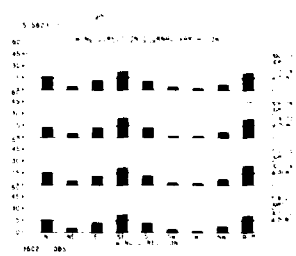
Cape Romanzof



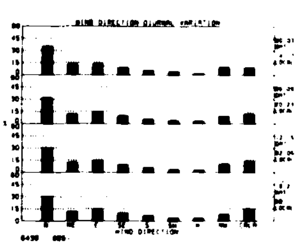
Bethel



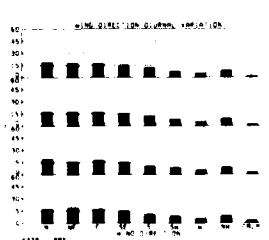
Cape Newenham



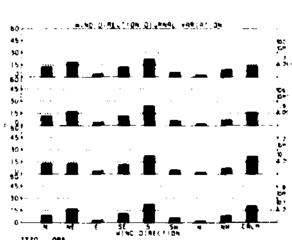
King Salmon



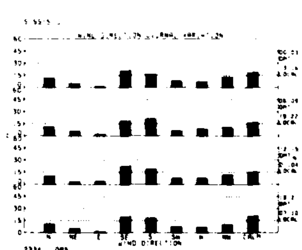
St. Paul



Port Moller

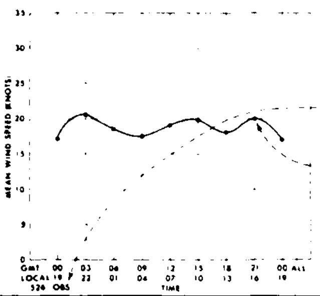


Driftwood Bay



10 Vector mean wind **January**

Legend — Wind speed/diurnal variation

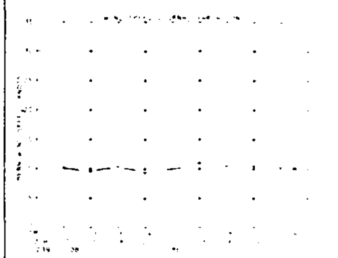


Map - Scalar mean wind

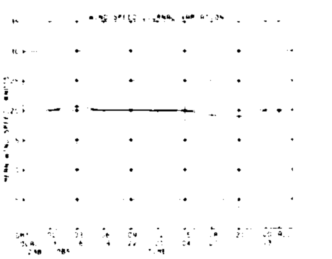
BLACK LINE Scalar mean wind (knots).

In areas of high persistence of direction, the magnitude of the vector mean winds should closely approach that of the scalar mean winds. As most of the marine observations are recorded at six hour intervals, disregard the plots for other than 00, 06, 12, 18 GMT hours on the marine area graphs.

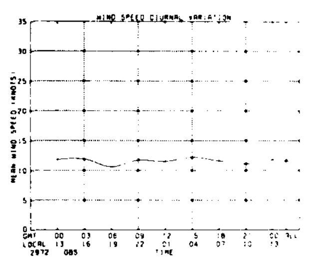
Buhta Provideniya



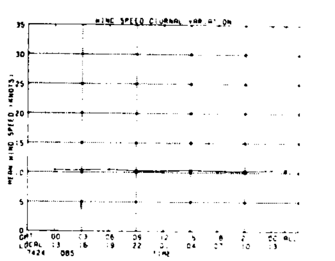
Gambell



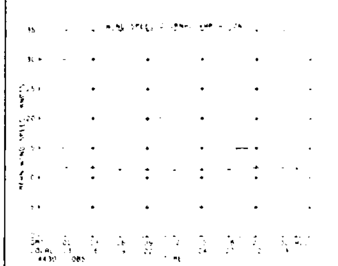
Northeast Cape



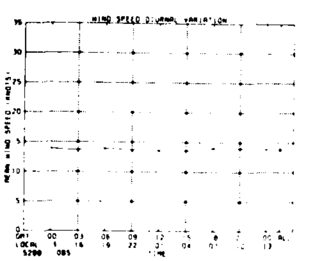
Nome



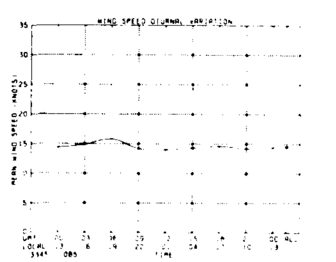
Moses Point



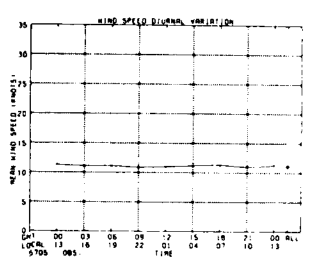
Unalakleet



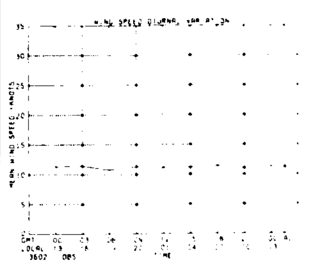
Cape Romanzof



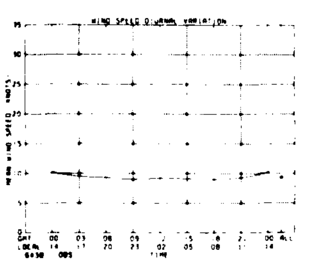
Bethel



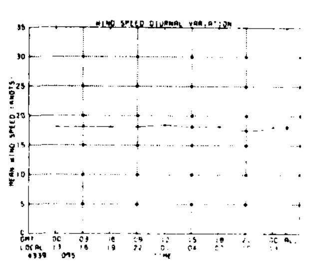
Cape Newenham



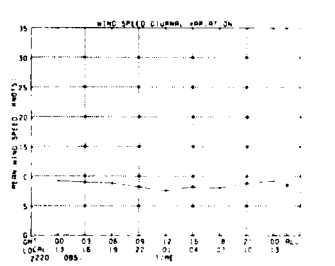
King Salmon



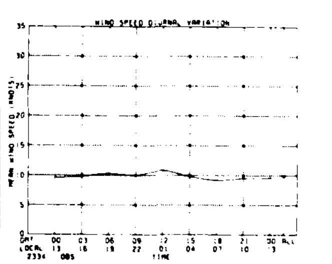
St. Paul

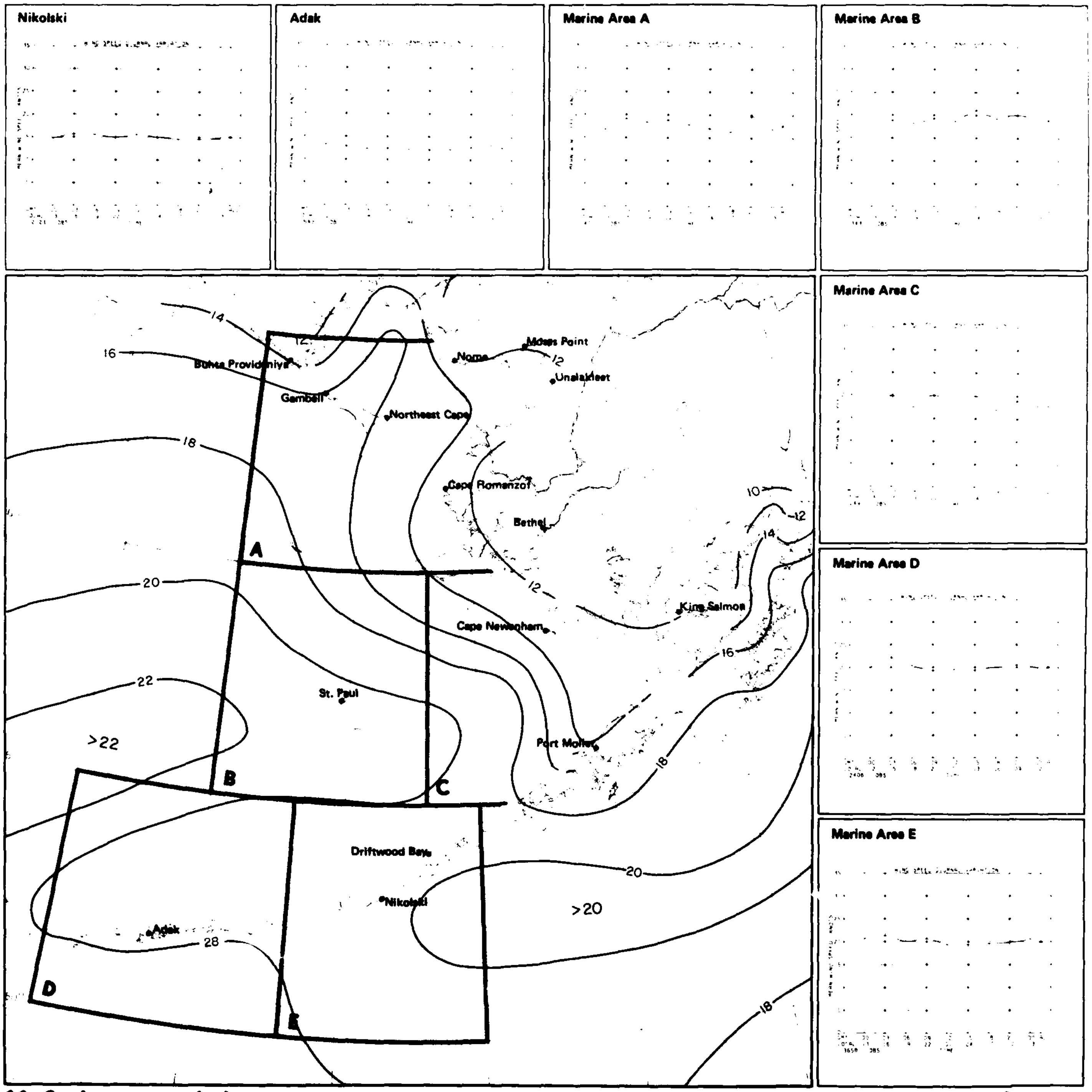


Port Moller



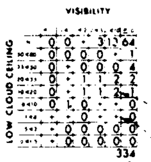
Driftwood Bay





11 Scalar mean wind **January**

Legend **Low cloud ceiling/visibility**



Percent frequency of simultaneous occurrence of specified low cloud ceilings (hundreds of feet) and visibilities (nautical miles).

Low cloud ceiling heights are estimated from the height of low clouds (h) when low cloud amount (N_h) is ≥5/8

Obscurations are included under ceiling 0 <1.5

N C (no ceiling) includes bases of clouds ≥8000 feet as well as occurrences of N_h <5/8

2% of all observations reported ceiling ≥1000 but <2000 feet simultaneously with visibility ≥5 but <10 nautical miles

• indicates <.5% but >0

Number of observations

Map - Low cloud ceiling and visibility thresholds

BLACK LINE Percent frequency of low cloud ceiling ≥1000 feet or no low cloud ceiling and visibility ≥5 nautical miles

BLUE LINE Percent frequency of low cloud ceiling <600 feet and or visibility <2 nautical miles

Buhta Provideniya

Gambell

VISIBILITY / LOW CLOUD CEILING

	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	•	•	1	4	16	79
50<80	0	0	•	0	•	1
35<50	•	0	0	•	•	•
20<35	0	•	•	1	2	1
10<20	1	1	2	3	8	3
6<10	•	1	3	3	3	1
3<6	•	1	1	1	1	0
1.5<3	•	•	0	0	0	0
0<1.5	7	2	•	0	0	0

1233

Northeast Cape

VISIBILITY / LOW CLOUD CEILING

	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	•	•	1	•	19	35
50<80	[illegible]	[illegible]	[illegible]	[illegible]	•	•
35<50	[illegible]	[illegible]	[illegible]	•	•	•
20<35	•	•	•	1	4	1
10<20	•	[illegible]	[illegible]	[illegible]	6	1
6<10	[illegible]	[illegible]	1	[illegible]	[illegible]	•
3<6	•	•	•	•	•	•
1.5<3	[illegible]	[illegible]	•	[illegible]	0	0
0<1.5	4	3	1	•	[illegible]	0

1838

Nome

VISIBILITY / LOW CLOUD CEILING

	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	1	•	•	1	11	46
50<80	•	•	•	•	1	2
35<50	•	•	•	•	1	1
20<35	•	•	•	•	•	2
10<20	•	1	1	3	4	1
6<10	•	1	1	2	2	•
3<6	•	•	1	1	•	•
1.5<3	•	•	•	•	•	0
0<1.5	4	3	1	•	•	0

7117

Moses Point

VISIBILITY / LOW CLOUD CEILING

	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	1	1	•	1	9	32
50<80	•	0	[illegible]	1	2	5
35<50	0	0	0	0	3	1
20<35	0	0	•	2	6	1
10<20	0	•	1	5	5	1
6<10	•	0	•	0	0	0
3<6	0	0	0	0	0	0
1.5<3	0	0	0	0	0	0
0<1.5	11	3	2	5	0	0

244

Unalakleet

VISIBILITY / LOW CLOUD CEILING

	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
50<80	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
35<50	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
20<35	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
10<20	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
6<10	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3<6	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1.5<3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
0<1.5	4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible]

Cape Romanzof

VISIBILITY / LOW CLOUD CEILING

	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	3	2	1	6	25	20
50<80	0	0	•	•	1	2
35<50	0	0	•	•	1	•
20<35	•	•	•	1	4	1
10<20	1	1	1	3	4	1
6<10	•	2	1	4	3	•
3<6	•	1	1	1	•	0
1.5<3	•	0	0	0	0	0
0<1.5	6	3	1	•	0	0

2223

Bethel

VISIBILITY / LOW CLOUD CEILING

	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	1	1	1	2	13	43
50<80	0	•	•	•	1	3
35<50	•	•	•	•	2	3
20<35	•	•	•	1	3	4
10<20	•	•	1	2	3	2
6<10	•	•	1	1	2	1
3<6	•	•	1	•	1	•
1.5<3	0	•	•	•	•	•
0<1.5	3	2	1	1	•	•

5678

Cape Newenham

VISIBILITY / LOW CLOUD CEILING

	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	•	•	1	2	18	24
50<80	•	[illegible]	•	•	1	1
35<50	0	•	0	•	1	•
20<35	•	•	•	1	3	1
10<20	•	•	1	4	8	3
6<10	•	[illegible]	2	5	6	2
3<6	•	•	1	1	1	•
1.5<3	0	0	•	0	0	0
0<1.5	4	2	2	1	0	0

2135

King Salmon

VISIBILITY / LOW CLOUD CEILING

	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	•	•	•	1	12	51
50<80	0	0	•	•	1	4
35<50	0	0	•	•	2	3
20<35	•	0	•	1	3	4
10<20	•	•	•	1	3	1
6<10	•	•	•	1	2	1
3<6	•	•	•	•	1	•
1.5<3	•	•	•	•	•	•
0<1.5	1	1	1	•	•	0

6212

St. Paul

VISIBILITY / LOW CLOUD CEILING

	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	•	•	1	1	19	7
50<80	0	•	0	•	•	•
35<50	0	•	•	•	1	•
20<35	1	•	1	2	11	2
10<20	2	1	2	6	18	2
6<10	•	•	1	3	3	•
3<6	•	1	2	2	1	•
1.5<3	•	•	•	0	•	0
0<1.5	4	2	1	•	0	0

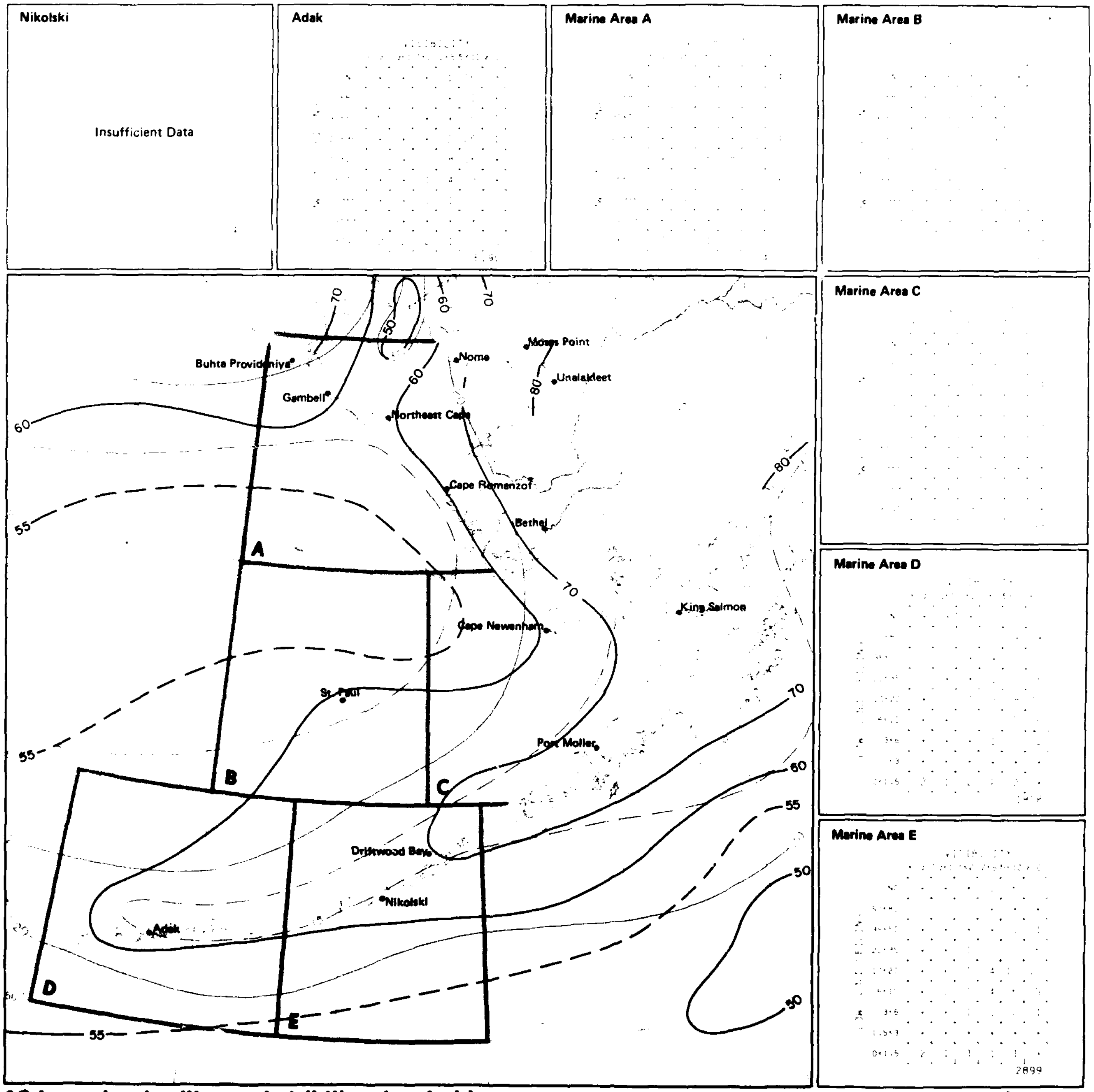
4058

Port Moller

Insufficient Data

Driftwood Bay

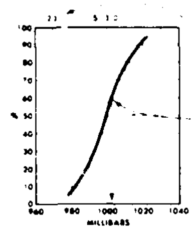
Insufficient Data



12 Low cloud ceiling and visibility thresholds **January**

Legend

Sea level pressure



- Number of observations

Cumulative percent frequency of sea level pressures equal to or less than the pressure intersected by the curve

S Standard deviation of pressure (mbs)

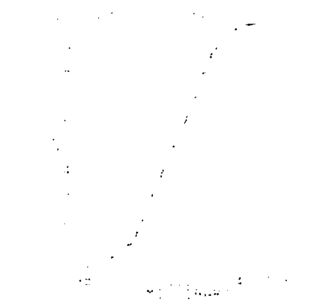
(60% of all observed sea level pressures were ≤1002 millibars)

Map - Mean sea level pressure

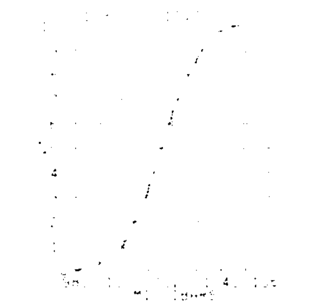
BLACK LINE Mean sea level pressure (millibars)

Sea level pressure is one of the most frequently recorded elements but one of the least accurate because of instrument and coding errors. Despite the inaccuracies of the individual readings, however, the large scale patterns and mean gradients of the isopleth analyses are relatively accurate.

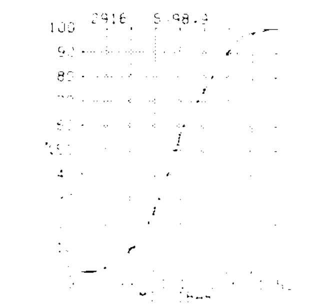
Buhta Provideniya



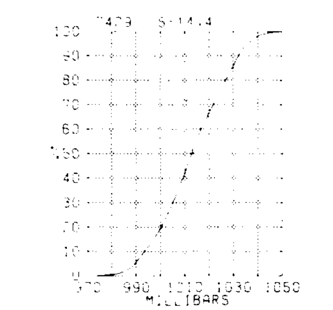
Gambell



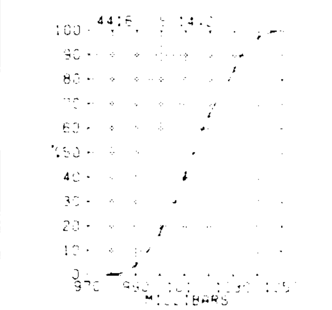
Northeast Cape



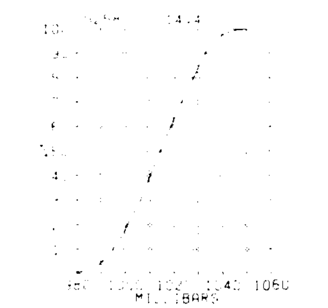
Nome



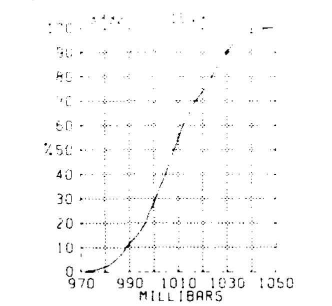
Moses Point



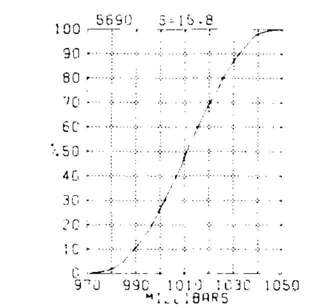
Unalakleet



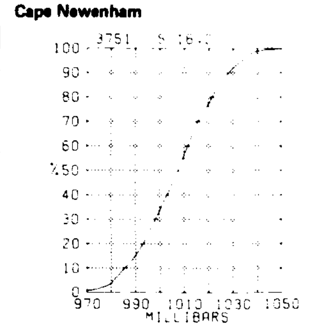
Cape Romanzof



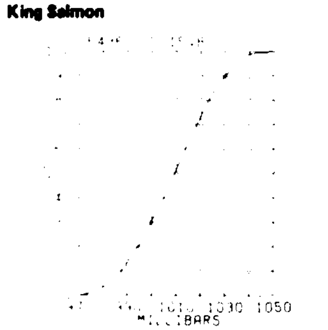
Bethel



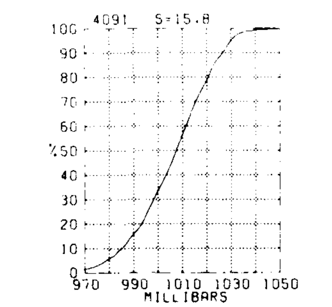
Cape Newenham



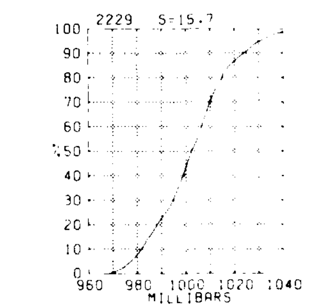
King Salmon



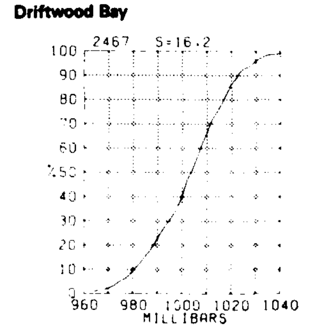
St. Paul

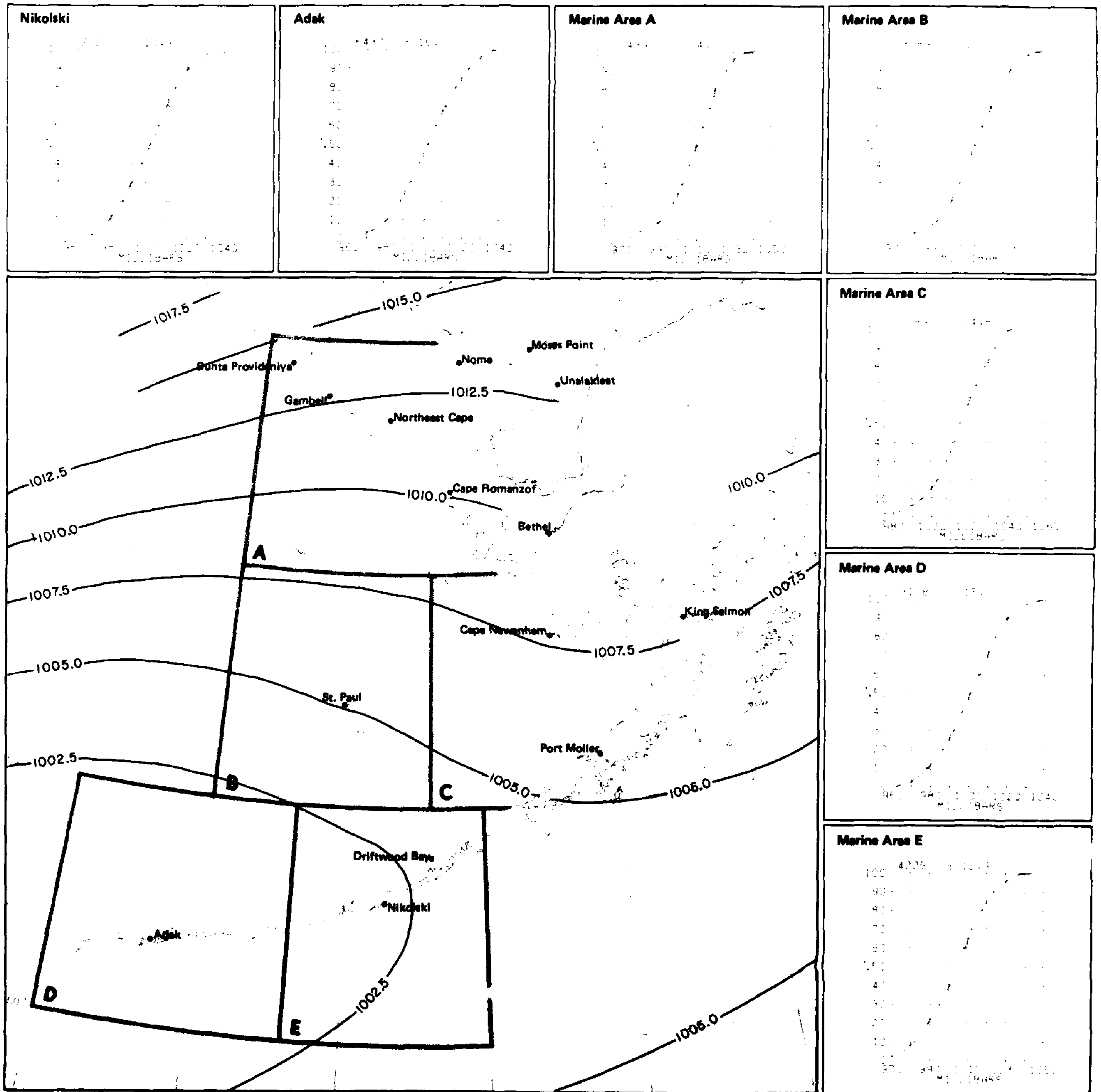


Port Moller



Driftwood Bay



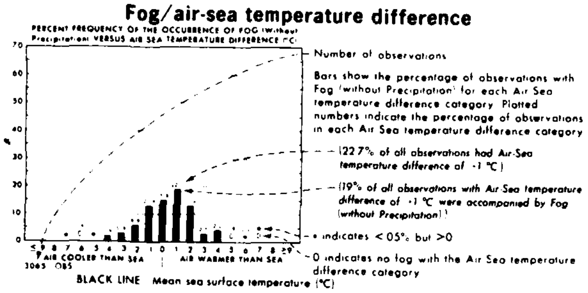


13 Mean sea level pressure

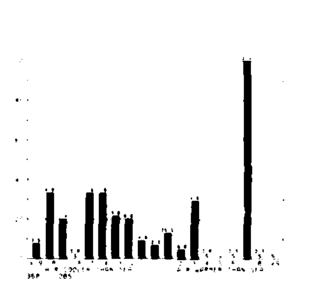
January

Legend

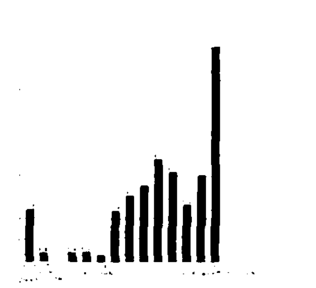
Fog/air-sea temperature difference



Marine Area A

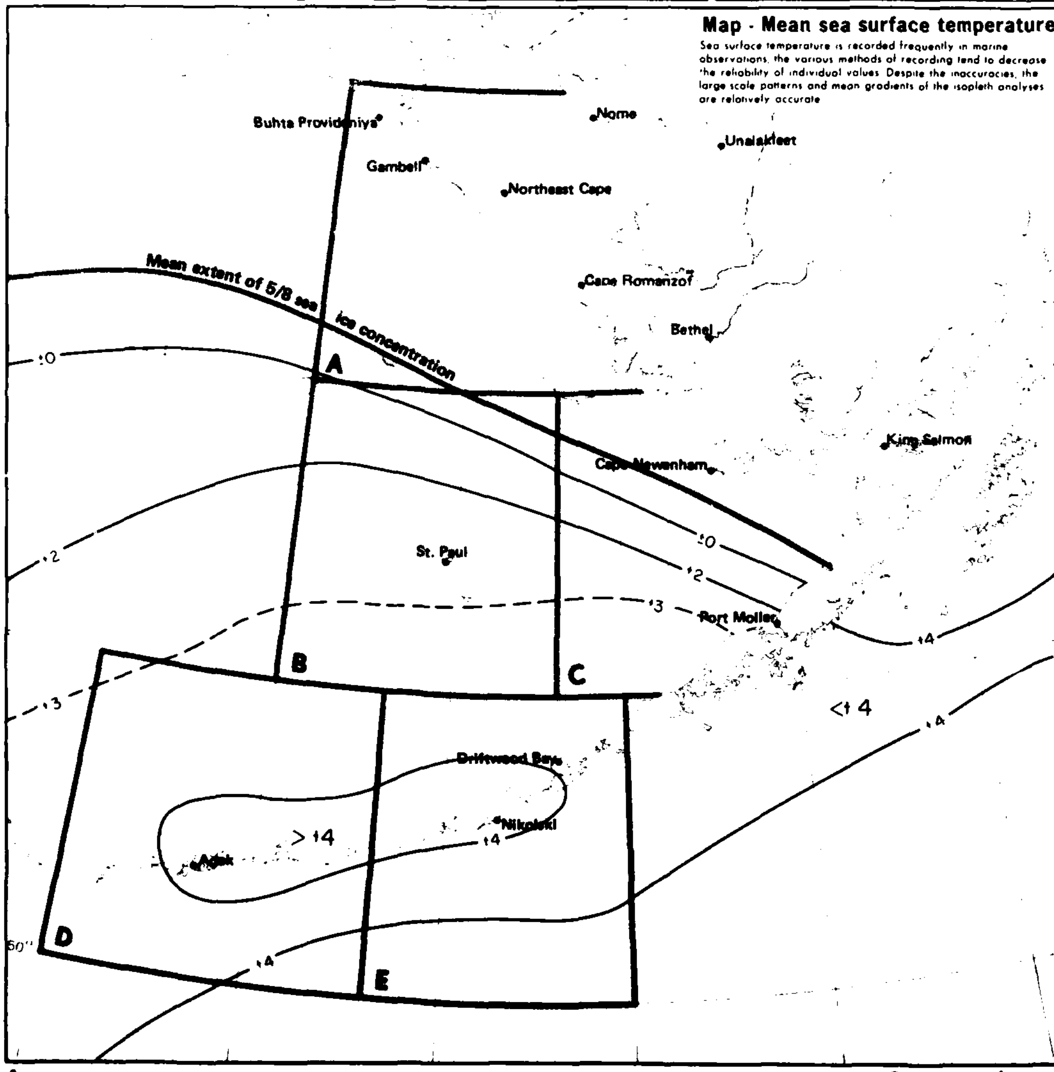


Marine Area B

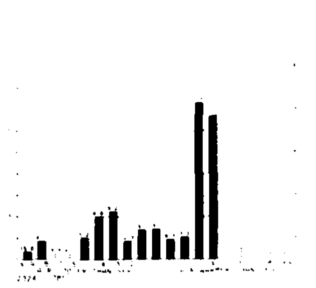


Map - Mean sea surface temperature

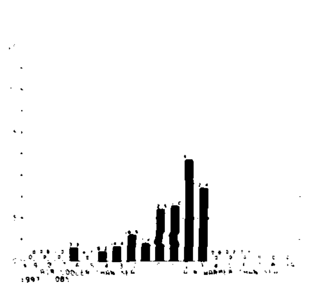
Sea surface temperature is recorded frequently in marine observations, the various methods of recording tend to decrease the reliability of individual values. Despite the inaccuracies, the large scale patterns and mean gradients of the isopleth analyses are relatively accurate



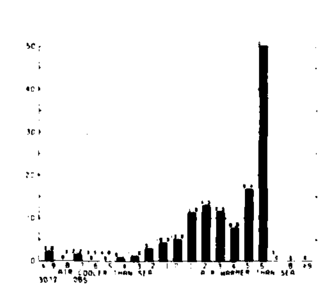
Marine Area C



Marine Area D

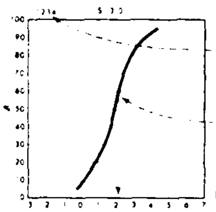


Marine Area E



Legend

Sea surface temperature



Number of observations

Cumulative percent frequency of sea surface temperatures equal to or less than the temperature intersected by the curve

60% of all observed sea surface temperatures were ≤2.1°C or ≤35.8°F

S Standard deviation of sea surface temperatures °C

BLACK LINE Maximum 99% sea surface temperature °C (1% of the temperatures were greater than the given value)

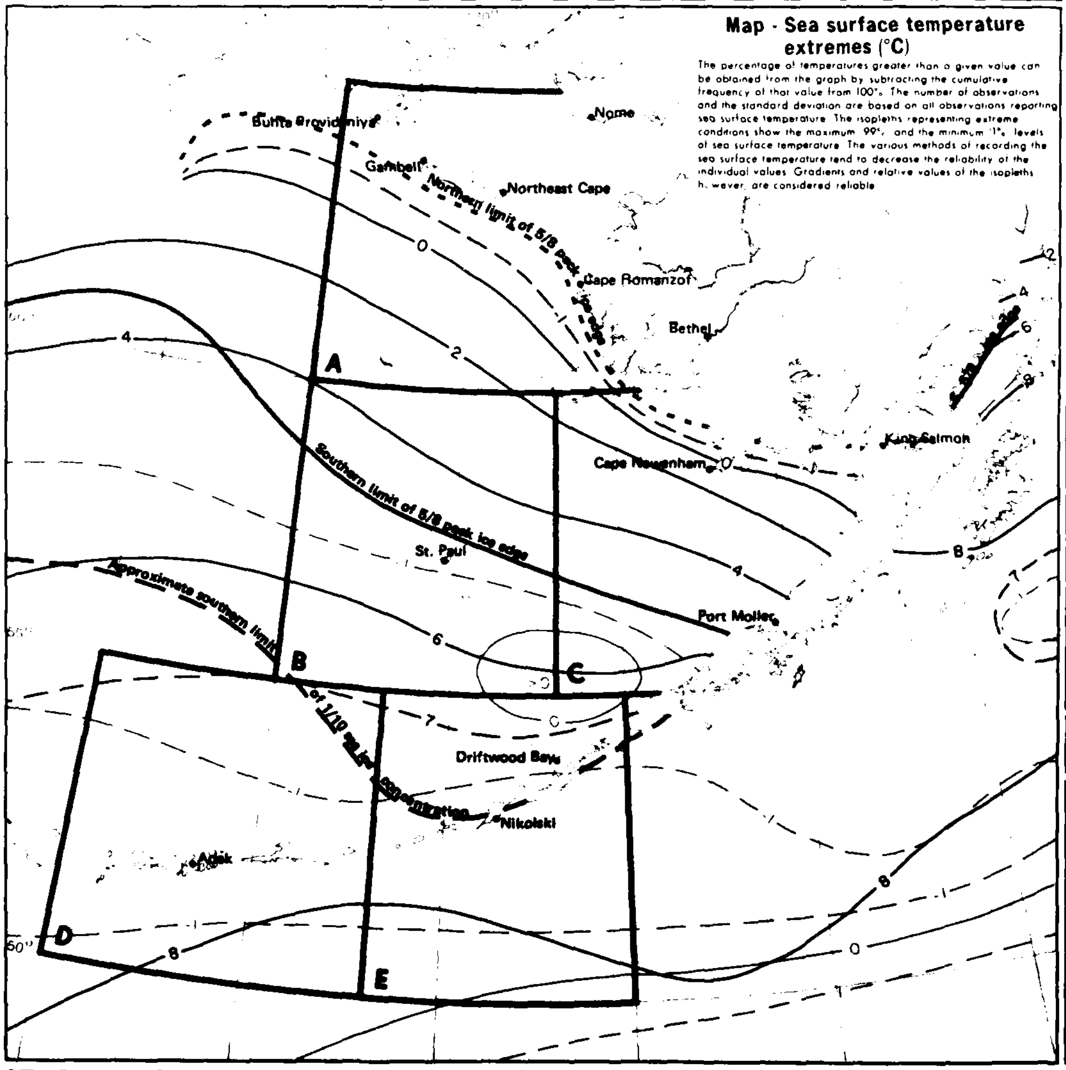
BLUE LINE Minimum 1% sea surface temperature °C (1% of the temperatures were equal to or less than the given value)

Marine Area A

Marine Area B

Map - Sea surface temperature extremes (°C)

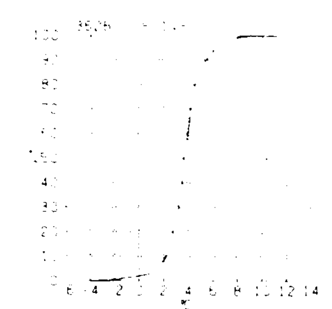
The percentage of temperatures greater than a given value can be obtained from the graph by subtracting the cumulative frequency of that value from 100%. The number of observations and the standard deviation are based on all observations reporting sea surface temperature. The isopleths representing extreme conditions show the maximum (99%) and the minimum (1%) levels of sea surface temperature. The various methods of recording the sea surface temperature tend to decrease the reliability of the individual values. Gradients and relative values of the isopleths however, are considered reliable.



Marine Area C

Marine Area D

Marine Area E



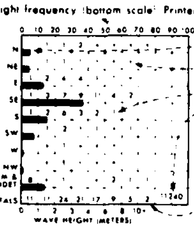
15 Sea surface temperature extremes **January**

Legend

Wave height/direction

Direction frequency (top scale): Bars represent percent frequency of waves from each direction

Height frequency (bottom scale): Printed figures represent percent frequency of wave heights observed from each direction



WAVE HEIGHT INTERVAL

Feet	0-2	3-6	7-9	10-12	13-19	20-25	26-32	≥33
Meters	0-.5	1-1.5	2-2.5	3-3.5	4-5.5	6-7.5	8-9.5	≥10

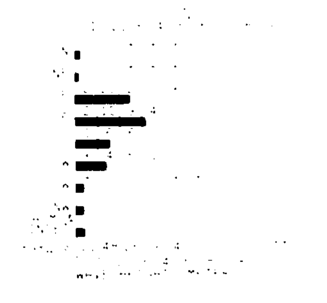
0 1 2 3 4 6 8 10+

Printed scale on bottom of chart

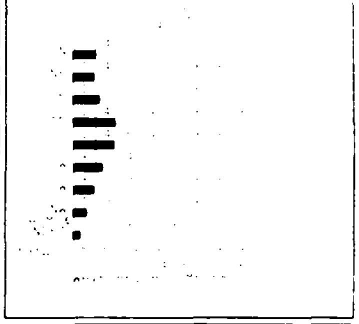
BLACK LINE Percent frequency of wave height <1.5 meters (<5 feet)

BLUE LINE Percent frequency of wave height <2.5 meters (<8 feet)

Marine Area A

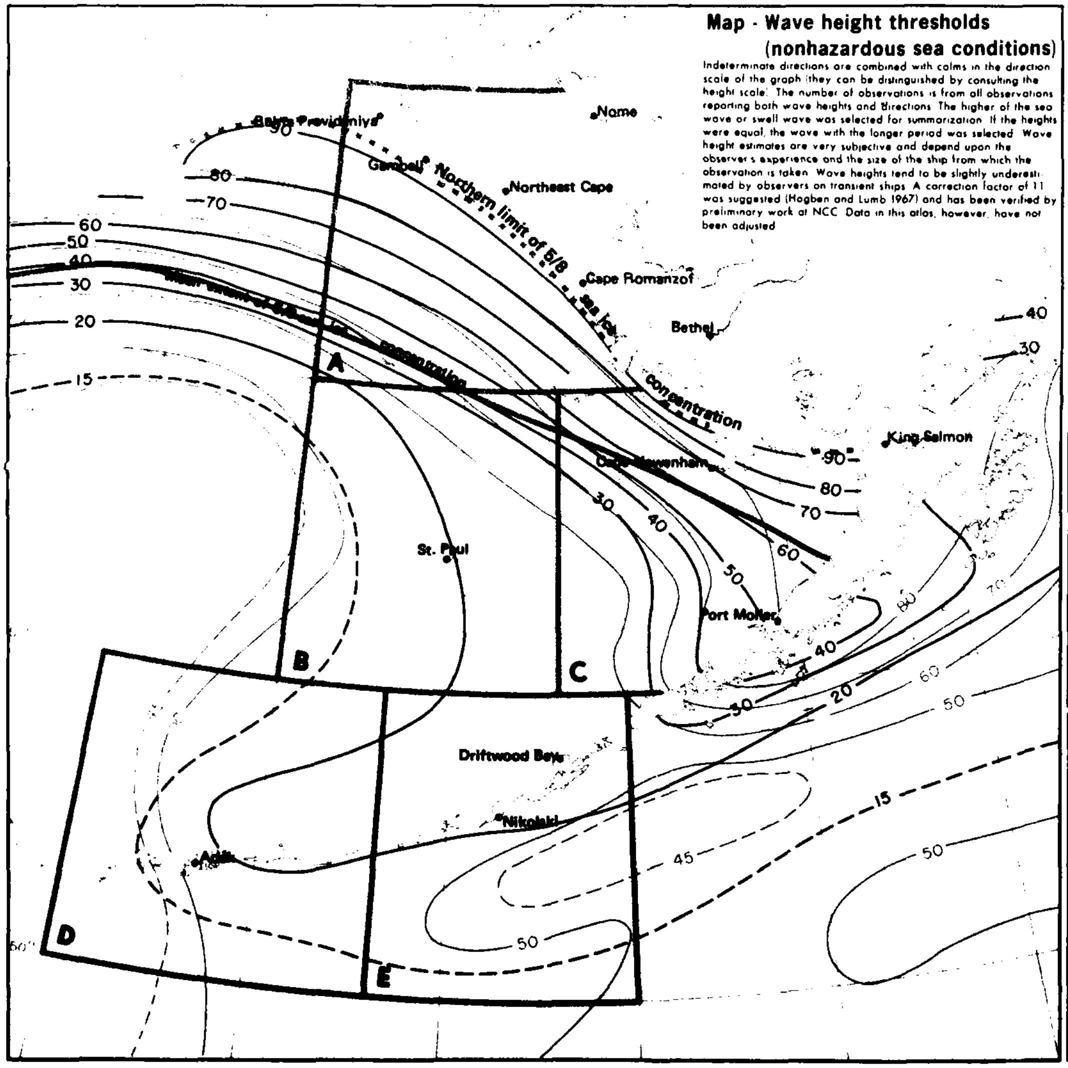


Marine Area B

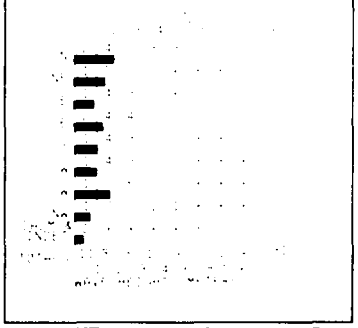


Map - Wave height thresholds (nonhazardous sea conditions)

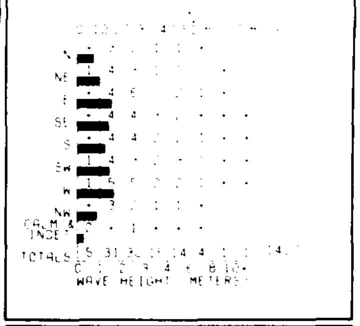
Indeterminate directions are combined with calms in the direction scale of the graph (they can be distinguished by consulting the height scale). The number of observations is from all observations reporting both wave heights and directions. The higher of the sea wave or swell wave was selected for summarization. If the heights were equal, the wave with the longer period was selected. Wave height estimates are very subjective and depend upon the observer's experience and the size of the ship from which the observation is taken. Wave heights tend to be slightly underestimated by observers on transient ships. A correction factor of 1.1 was suggested (Hogben and Lumb 1967) and has been verified by preliminary work at NCC. Data in this atlas, however, have not been adjusted.



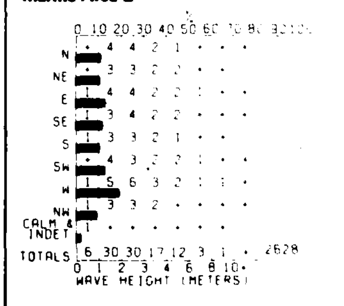
Marine Area C



Marine Area D



Marine Area E

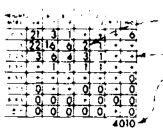


16 Wave height thresholds (nonhazardous)

Legend

Wave height/period

PERIOD Seconds



Percent frequency of occurrence of wave period and height

(2% of observed waves had a height of 1-1.5 meters and a period of 10-11 seconds.)

indicates < 5% but > 0

Number of observations

Waves are selected on the basis of the higher of sea and swell when both are reported. If both heights are equal, the wave with the longer period is selected.

BLACK LINE Percent frequency of wave height ≥3.5 meters (≥12 feet)

BLUE LINE Percent frequency of wave height ≥6 meters (≥20 feet)

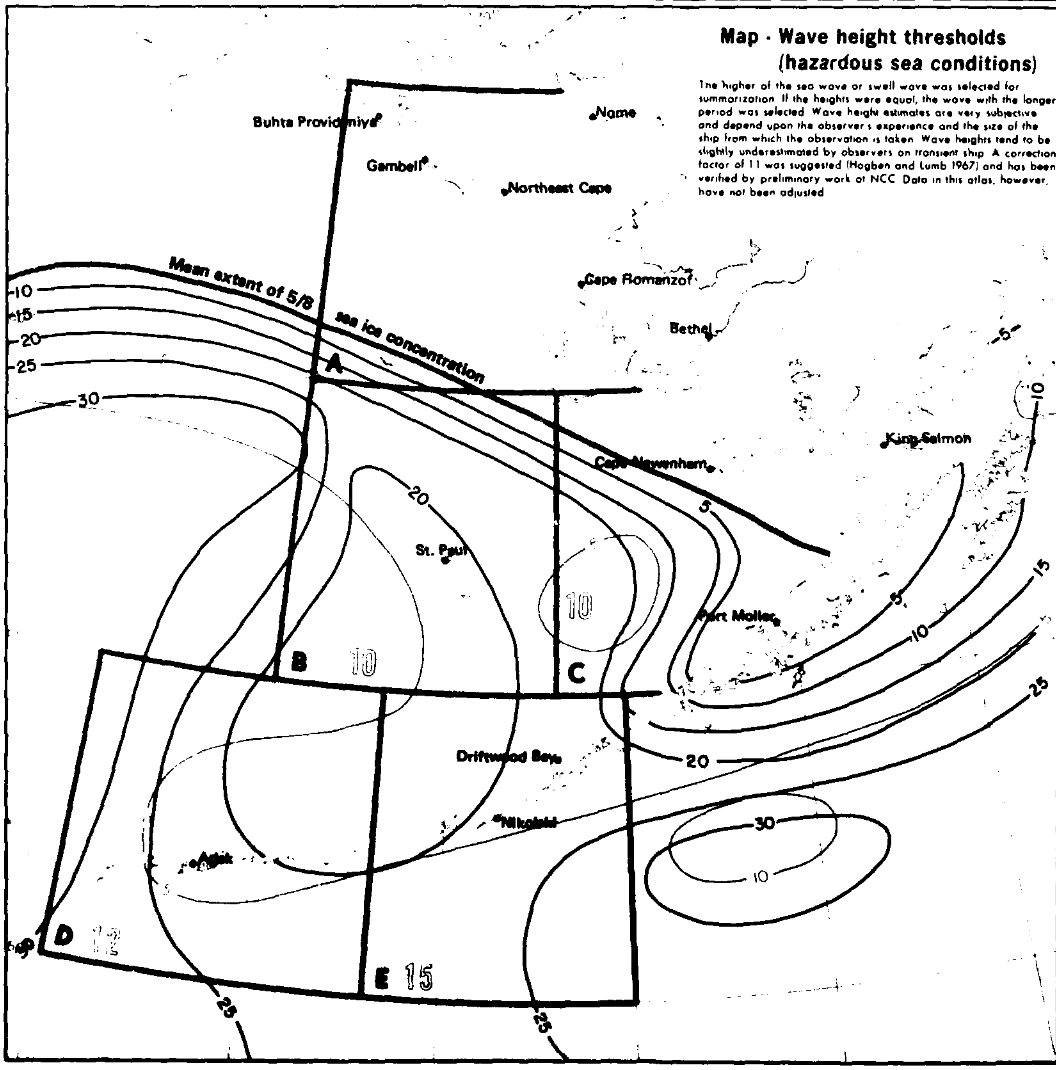
BLUE NUMBER Maximum observed wave height (meters)

Marine Area A

Marine Area B

Map · Wave height thresholds (hazardous sea conditions)

The higher of the sea wave or swell wave was selected for summarization. If the heights were equal, the wave with the longer period was selected. Wave height estimates are very subjective and depend upon the observer's experience and the size of the ship from which the observation is taken. Wave heights tend to be slightly underestimated by observers on transient ship. A correction factor of 1.1 was suggested (Hogben and Lumb 1967) and has been verified by preliminary work at NCC. Data in this atlas, however, have not been adjusted.



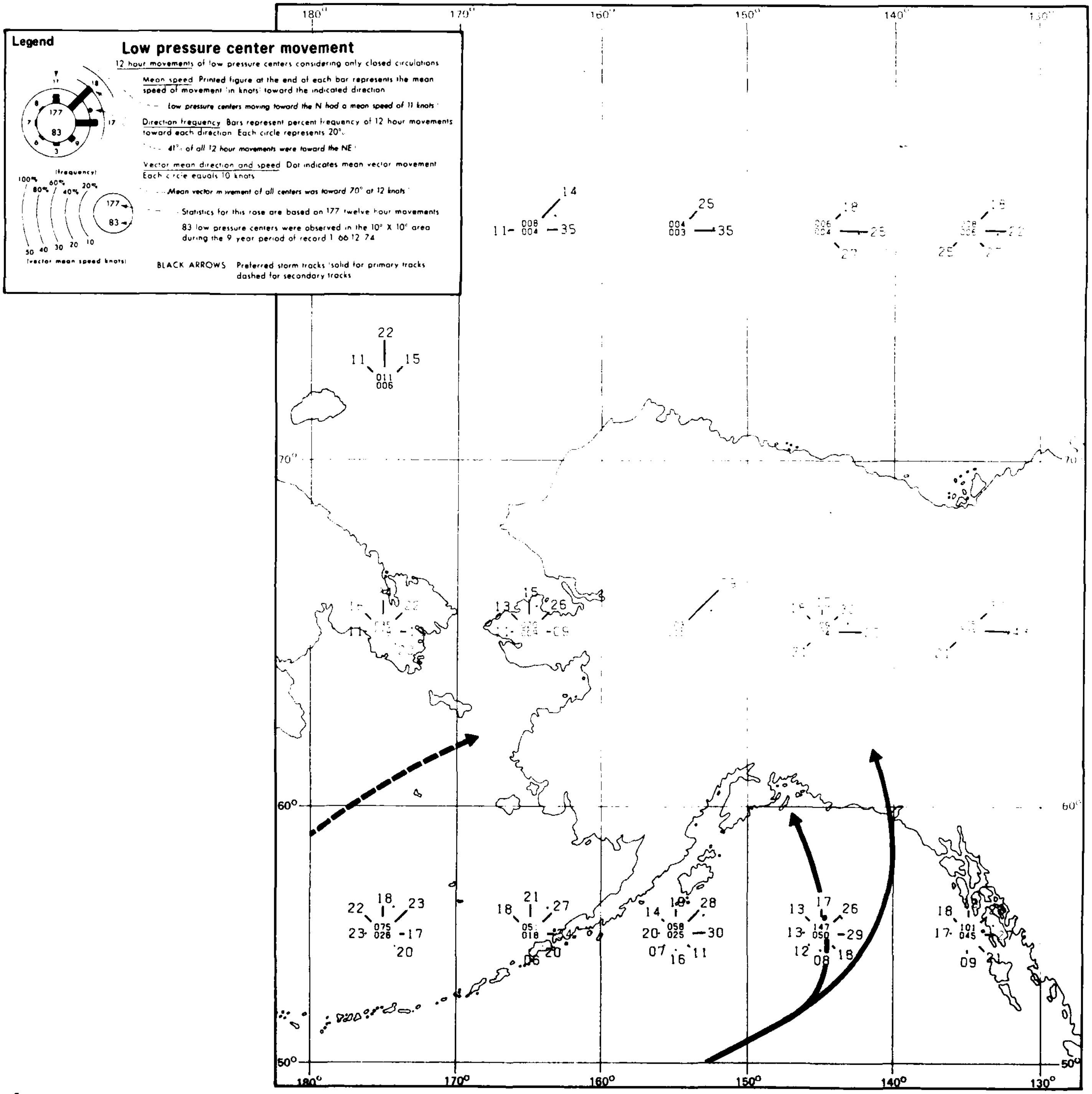
Marine Area C

Marine Area D

Marine Area E

17 Wave height thresholds (hazardous)

January

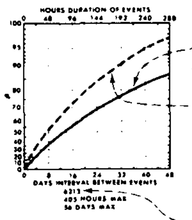


January

18 Low pressure center movement

Legend

Persistence of visibility <2 n. mi.



Hours duration of events · Days interval between events

Cumulative percent frequency of hours duration equal to or less than the number of hours intersected by the solid curve

(80% of the events had a duration ≤216 hours.)

Cumulative percent frequency of days interval between events equal to or less than the number of days intersected by the broken curve

(88% of the events were followed by another event in 28 days or less.)

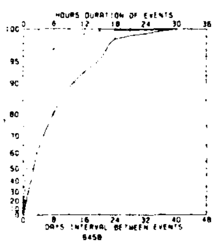
The maximum value(s) of hours duration and/or the days interval will be displayed when the graph limits are exceeded.

Durations and intervals for a particular month extend from the time they begin (or the first of the month if already in progress) and are terminated at the actual ending time, regardless of what month that may be

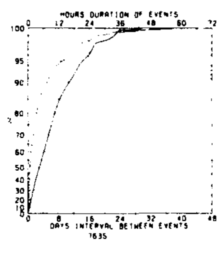
Number of observations

Top and bottom scales are variable to allow for variations in the data

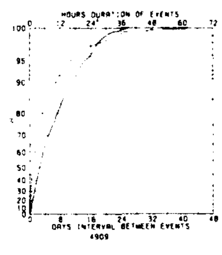
Adak



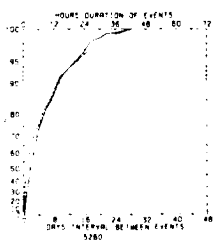
Nome



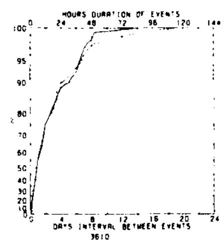
Moses Point



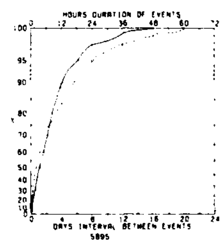
Unalakleet



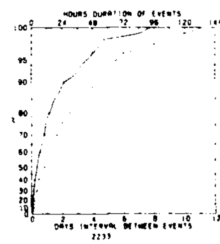
Cape Romanzof



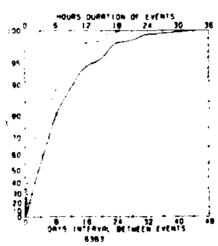
Bethel



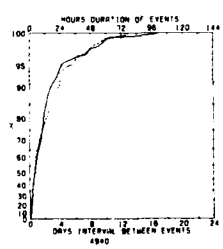
Nikolski



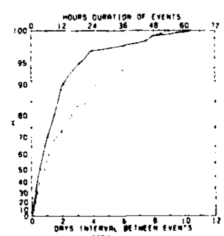
King Salmon



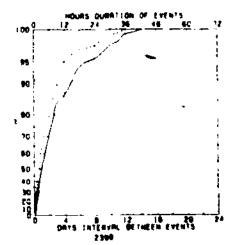
St. Paul



Port Moller



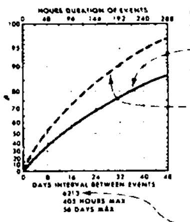
Driftwood Bay



19 Persistence of visibility <2 n. mi.

Legend

Persistence of wind ≥10 kts.



Hours duration of events Days interval between events

Cumulative percent frequency of hours duration equal to or less than the number of hours intersected by the solid curve

(80% of the events had a duration ≤216 hours.)

Cumulative percent frequency of days interval between events equal to or less than the number of days intersected by the broken curve

(88% of the events were followed by another event in 28 days or less.)

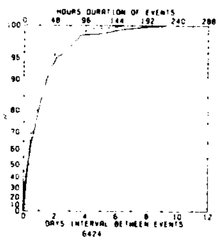
The maximum value(s) of hours duration and or the days interval will be displayed when the graph limits are exceeded

Durations and intervals for a particular month extend from the time they begin (or the first of the month if already in progress) and are terminated at the actual ending time, regardless of what month that may be

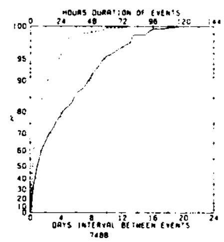
Number of observations

Top and bottom scales are variable to allow for variations in the data

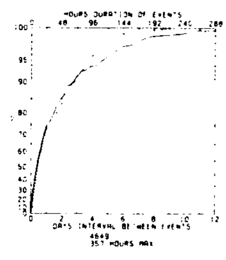
Adak



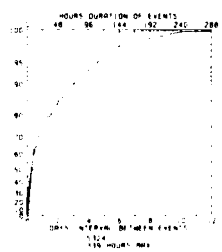
Nome



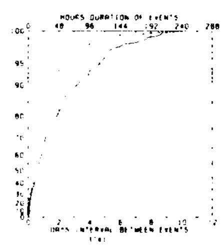
Moses Point



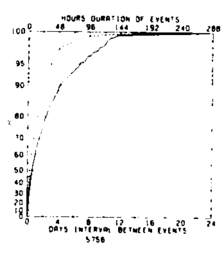
Unalakleet



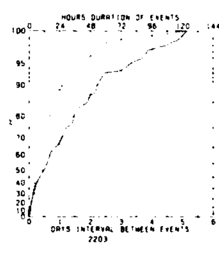
Cape Romanzof



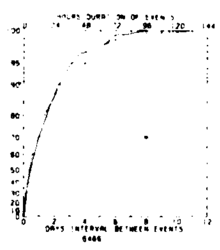
Bethel



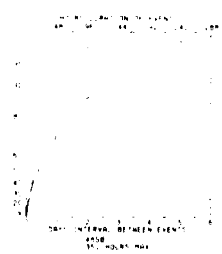
Nikolski



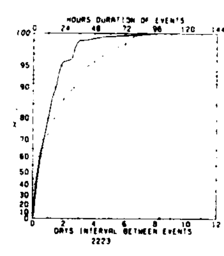
King Salmon



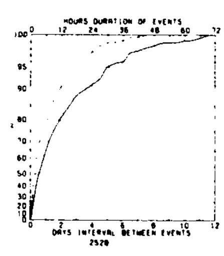
St. Paul



Port Moller

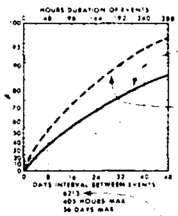


Driftwood Bay



Legend

Persistence of wind ≥20 kts.



Hours duration of events. Days interval between events

Cumulative percent frequency of hours duration equal to or less than the number of hours intersected by the solid curve

(80% of the events had a duration ≤216 hours.)

Cumulative percent frequency of days interval between events equal to or less than the number of days intersected by the broken curve

(88% of the events were followed by another event in 28 days or less.)

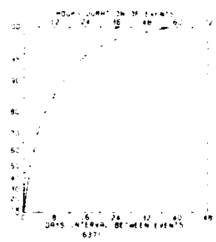
The maximum value(s) of hours duration and or the days interval will be displayed when the graph limits are exceeded

Durations and intervals for a particular month extend from the time they begin (or the first of the month if already in progress) and are terminated at the actual ending time regardless of what month that may be

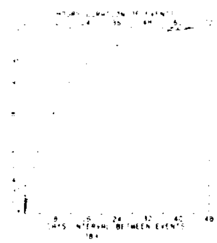
Number of observations

Top and bottom scales are variable to allow for variations in the data

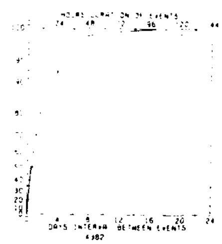
Adak



Nome

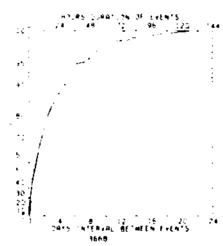


Moses Point

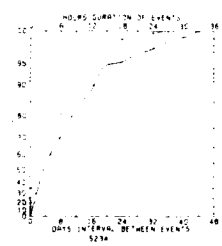


Unalakleet

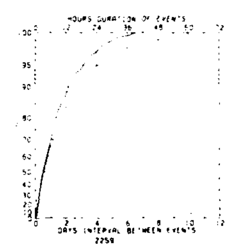
Cape Romanzof



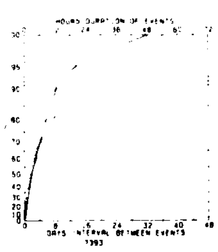
Bethel



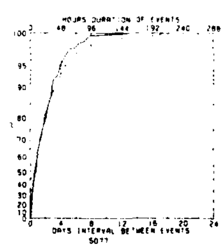
Nikolski



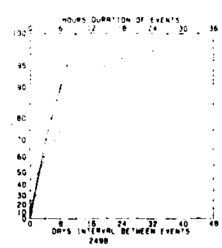
King Salmon



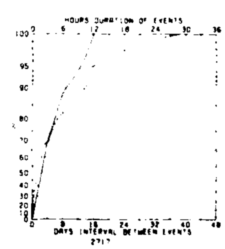
St. Paul



Port Moller



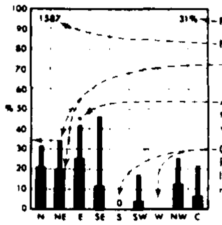
Driftwood Bay



21 Persistence of wind ≥20 kts. **January**

Legend

Precipitation/wind direction



Percent frequency of surface wind observations from each direction and calm that were accompanied by precipitation, subdivided into liquid type (including freezing rain and freezing drizzle) and snow

— Percentage of present weather observations reporting precipitation

— Number of observations

— 134% of all NE winds were accompanied by precipitation, of which 14% was liquid and 20% was snow

— An asterisk in the column for a given direction (or calm) indicates that the percentage was based on 10-30 observations of present weather and wind direction

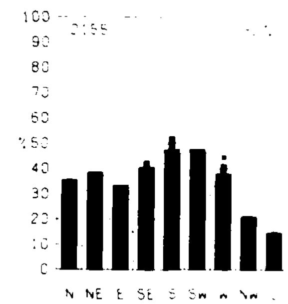
— 0 replaces bar when no precipitation was observed with winds from a given direction (or calm). No bar graph is presented if less than 10 observations containing present weather were reported for a given direction (or calm)

Map - Precipitation

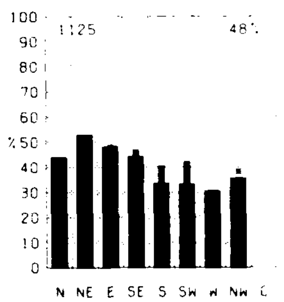
BLACK LINE Percent frequency of observations reporting precipitation

Of all the elements recorded in historical marine observations, precipitation is one of those most subject to interpretation error, from coding practices, observers preference for certain present weather codes, and other biases

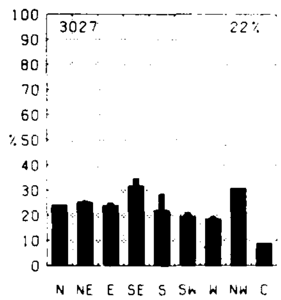
Buhta Provideniya



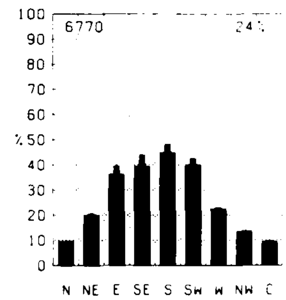
Gambell



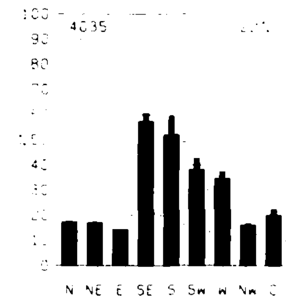
Northeast Cape



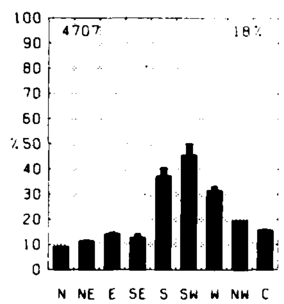
Nome



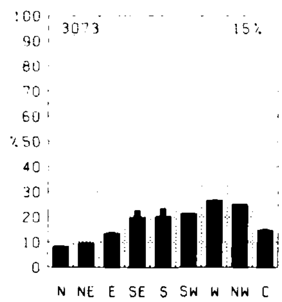
Moses Point



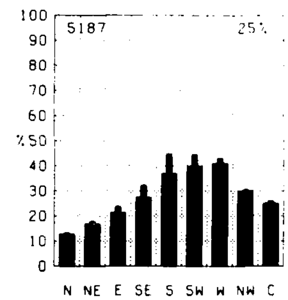
Unalakleet



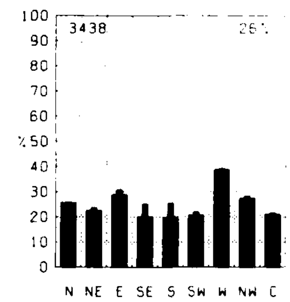
Cape Romanzof



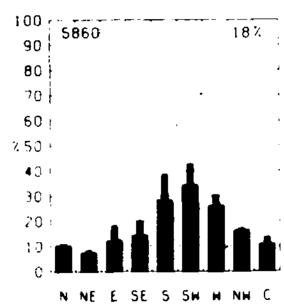
Bethel



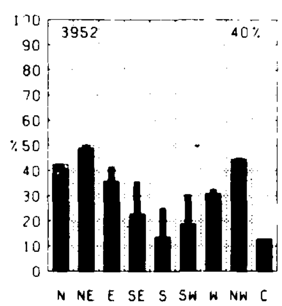
Cape Newenham



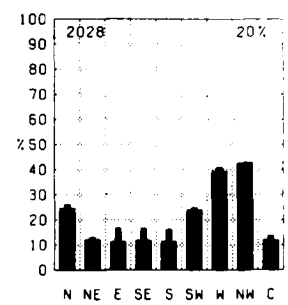
King Salmon



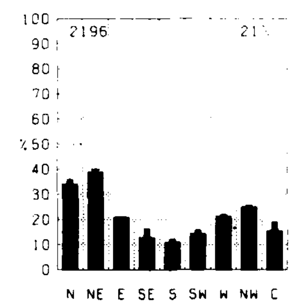
St. Paul

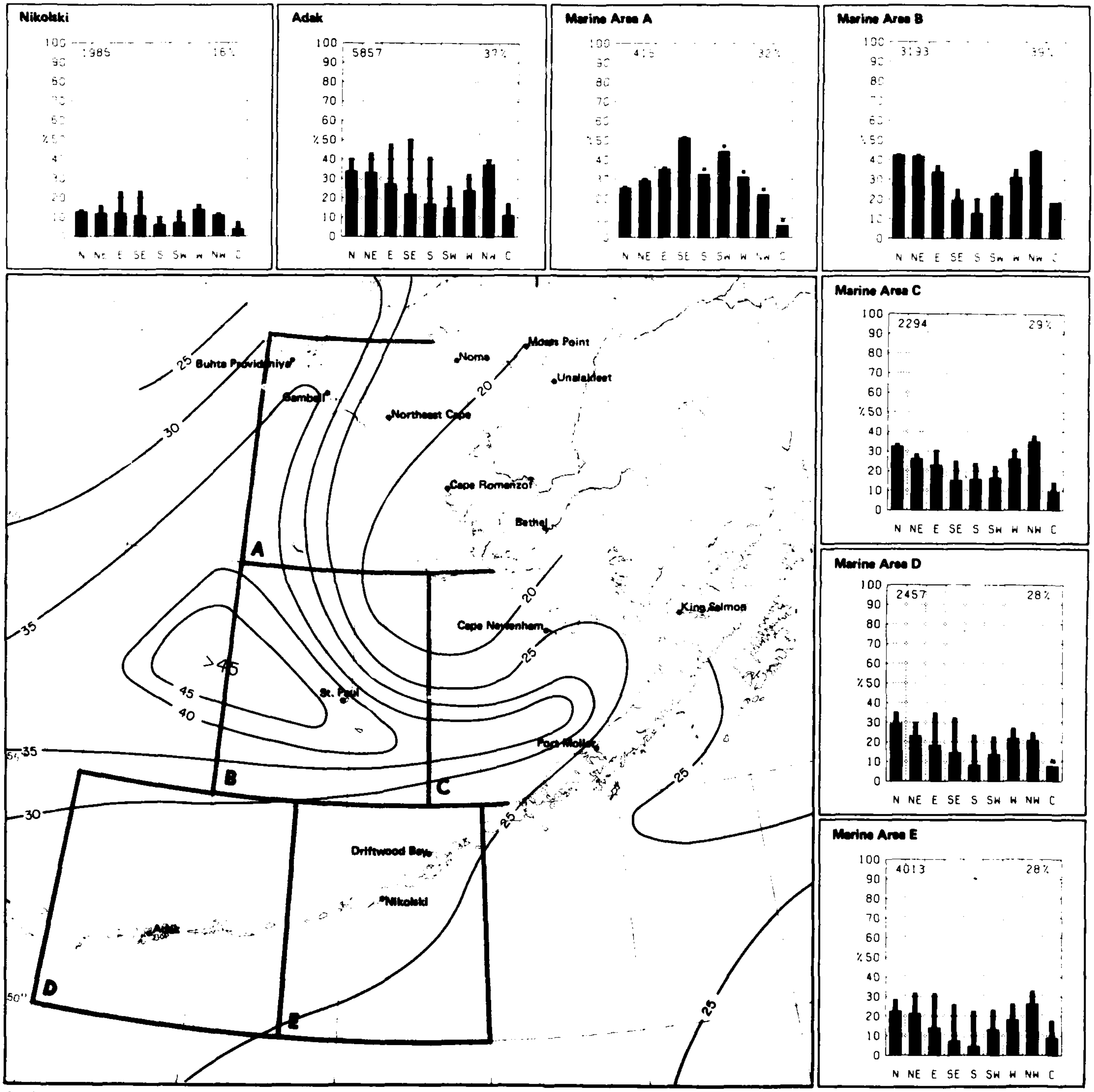


Port Moller



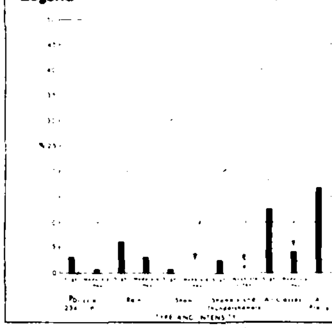
Driftwood Bay





1 Precipitation **February**

Legend **Precipitation types**



Percent frequency of precipitation by type and intensity

Number of observations

Bars show percent frequency of observations reporting Precipitation of various types and intensities

[illegible]

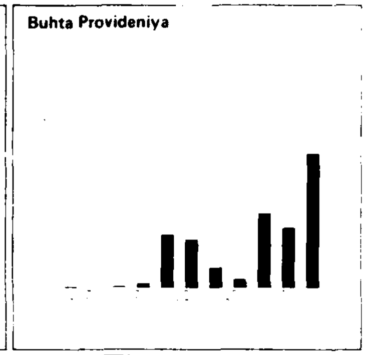
• [illegible]

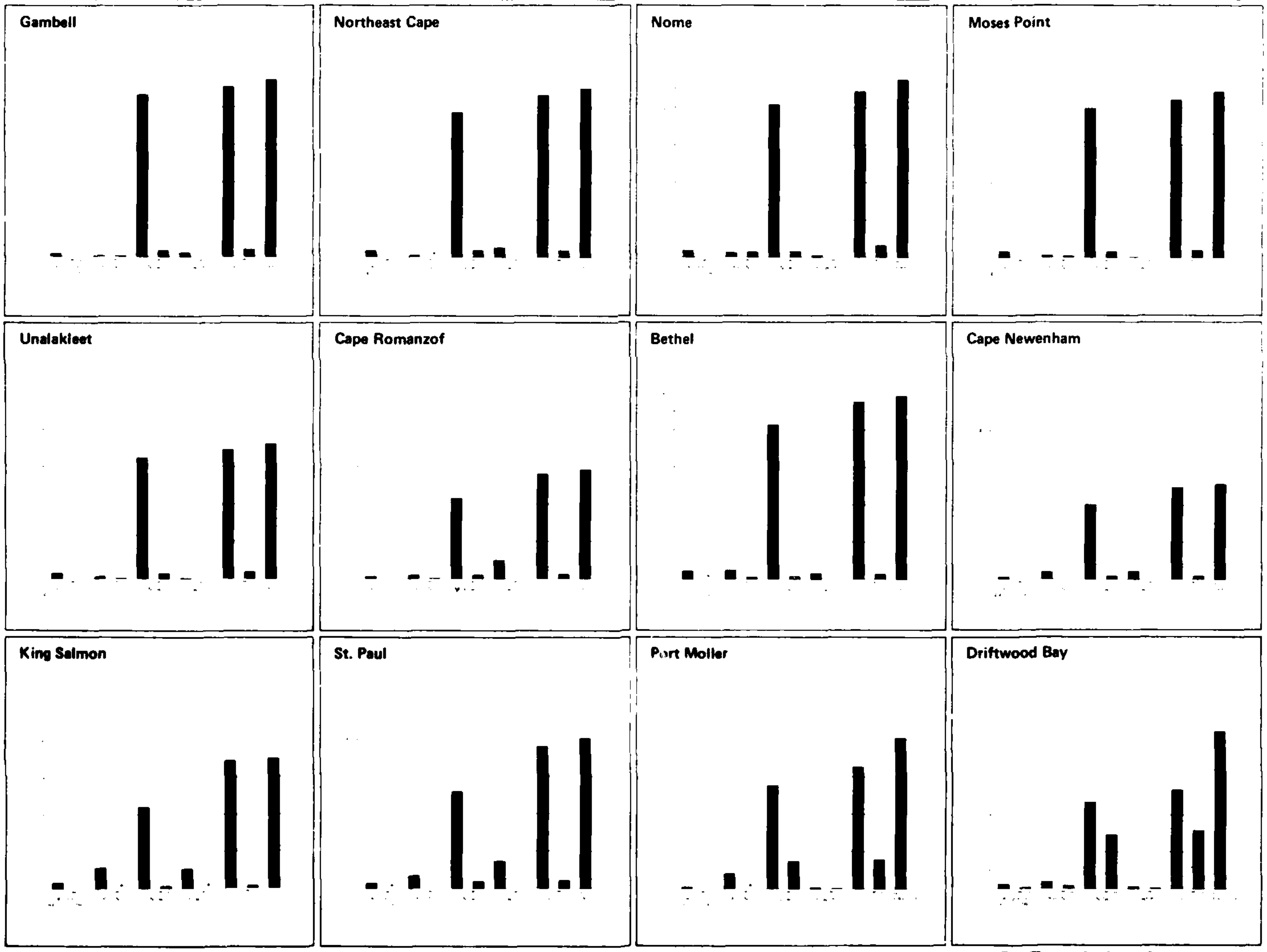
4.0 of all observations recorded moderate to heavy precipitation

Map - Snow

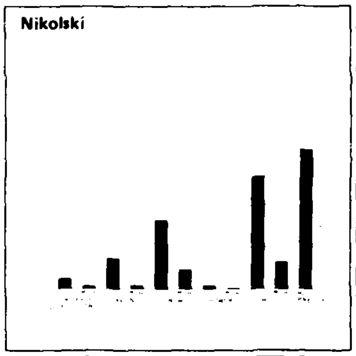
BLACK LINE Percent frequency of precipitation observations reporting snow

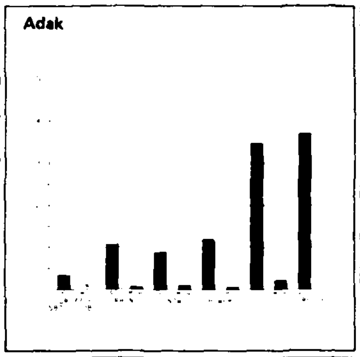
The percent frequency of observations reporting snow for a given point can be determined by multiplying the percent frequency of observations reporting precipitation map 1 with that of precipitation observations reporting snow map 2

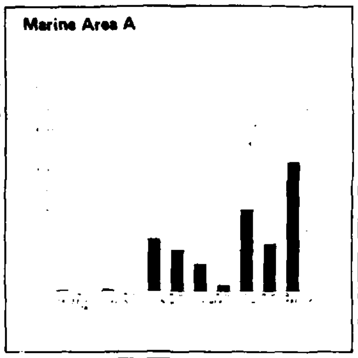


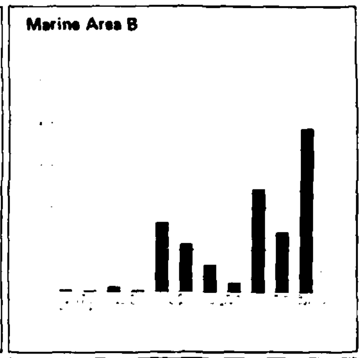


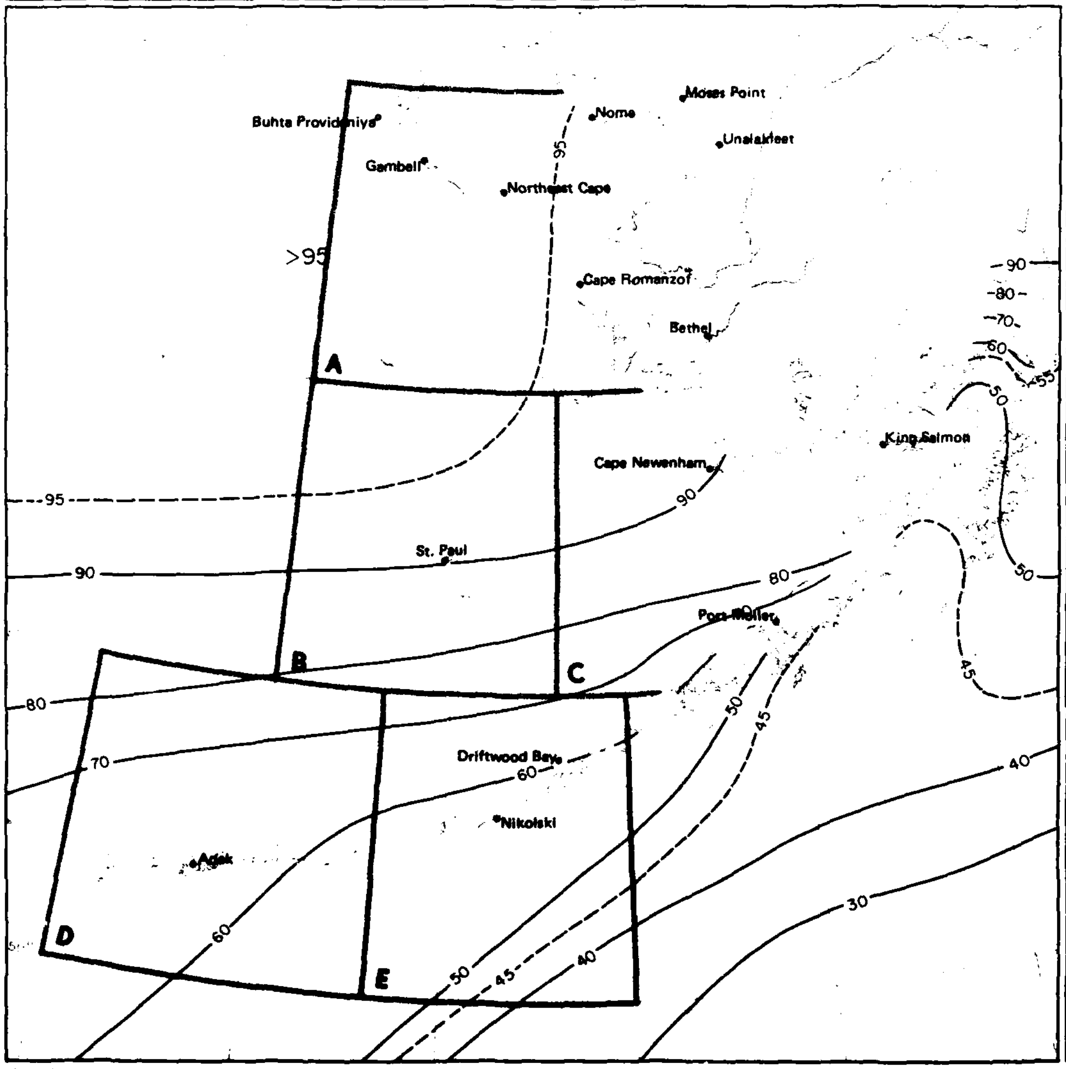
February **2 Precipitation types**

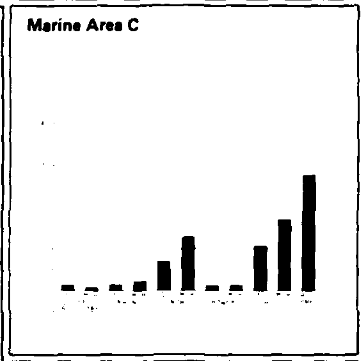


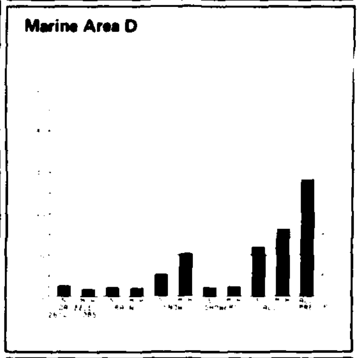


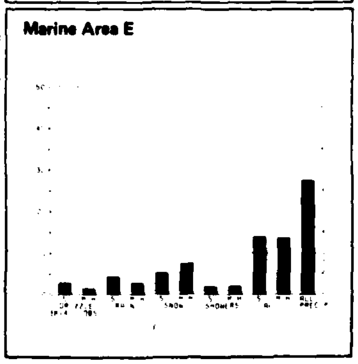








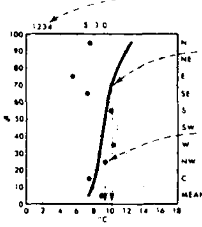




2 Snow **February**

Legend

Air temperature/wind direction



Number of observations

Cumulative percent frequency of temperatures equal to or less than the temperature intersected by the curve

70% of all temperatures were ≤10.3 °C or ≤50.5 °F

S Standard deviation of temperatures (°C

Mean temperature for each wind direction calm and for all data combined are represented by dots

With NW winds, the mean temperature was 9.4 °C or 48.9 °F

Indicates that the mean temperature for a direction or calm was computed from 10 30 observations

The mean temperature is omitted when less than 10 observations for a direction or calm were available

Map - Air temperature mean and thresholds

BLACK LINE Percent frequency of temperature ≤0°C (≤32°F

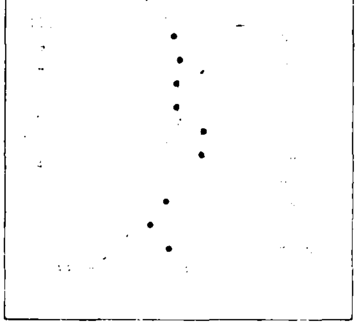
RED LINE Mean air temperature °C

BLUE LINE Percent frequency of wind chill temperature ≤ 30°C (≤ 22°F

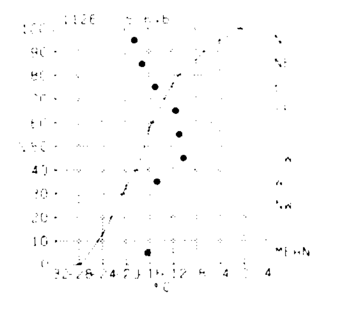
Air temperature readings recorded on transient ships in warm sunny weather appear biased toward high temperatures apparently because of improper instrument exposure and ventilation Despite the inaccuracies the large scale patterns and mean gradients of the isopleth analyses are relatively accurate

The temperature scale of the graph may vary in both range and class interval The percentage of temperature observations greater than a given value can be obtained by subtracting the cumulative percent frequency of that value from 100%. The number of observations and the standard deviation plus the plotted points on the graphs are based on those observations reporting both temperature and wind direction The cumulative curve is based on all observations reporting temperature with or without wind direction

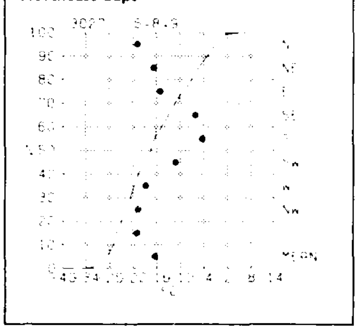
Buhta Provideniya



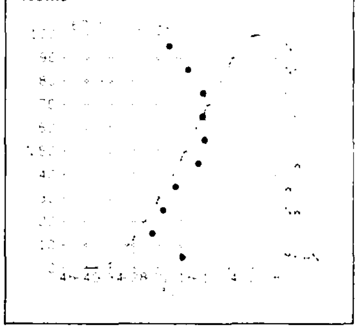
Gambell



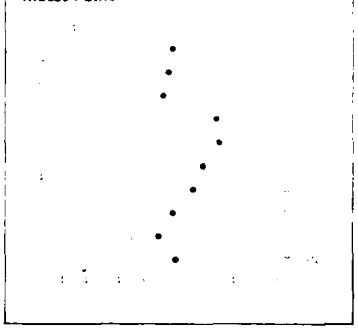
Northeast Cape



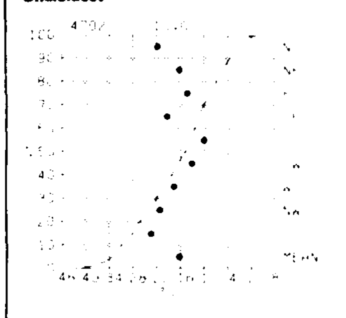
Nome



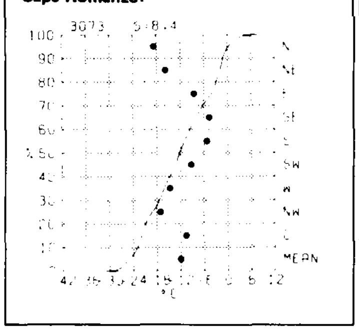
Moses Point



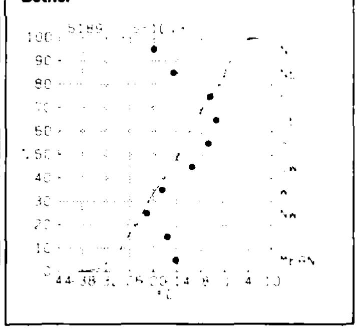
Unalakleet



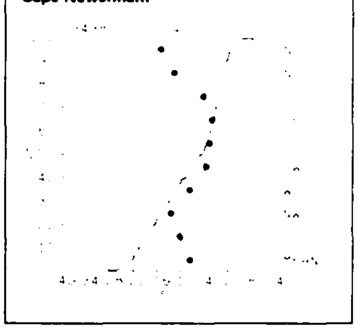
Cape Romanzof



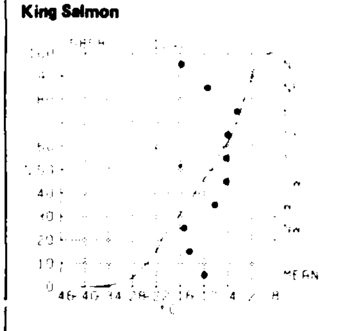
Bethel



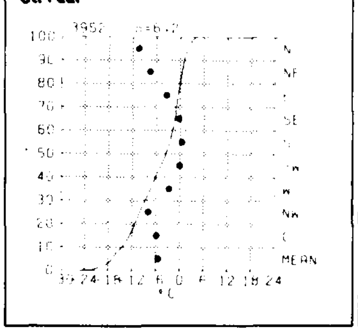
Cape Newenham



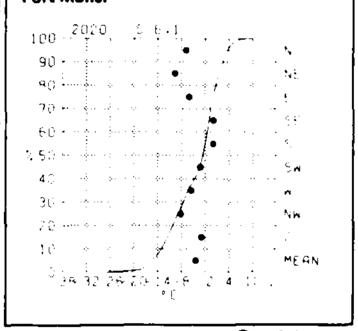
King Salmon



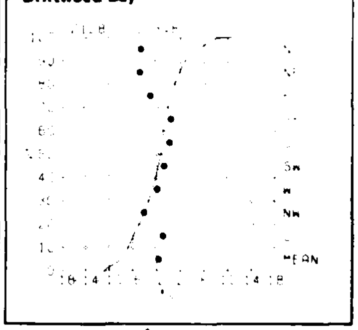
St. Paul

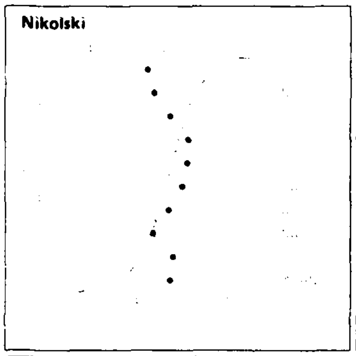


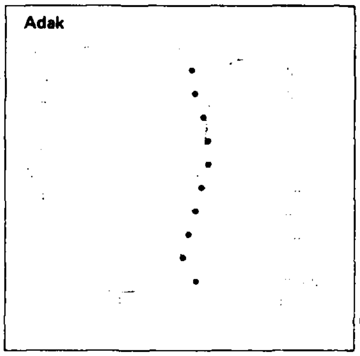
Port Moller

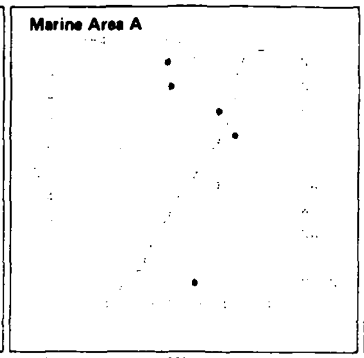


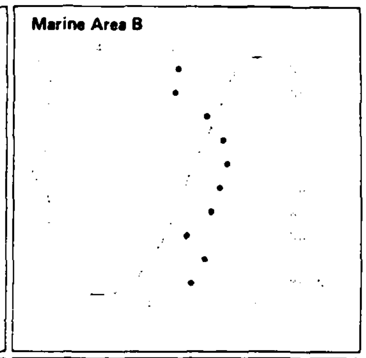
Driftwood Bay

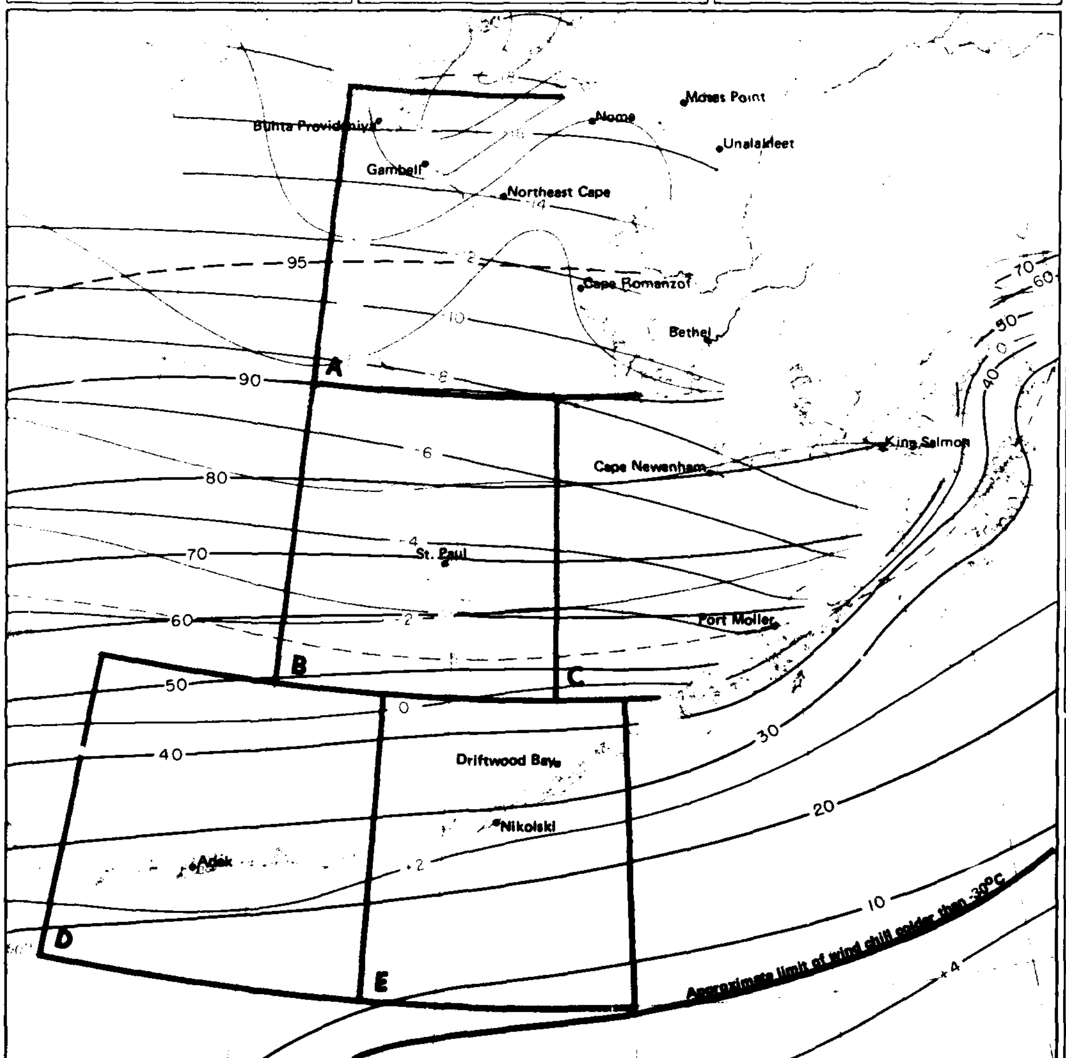


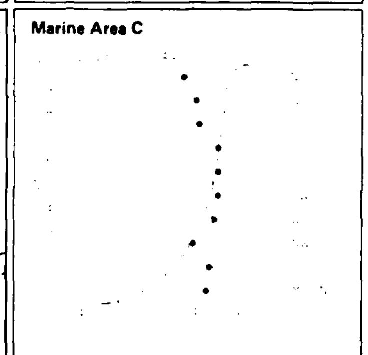


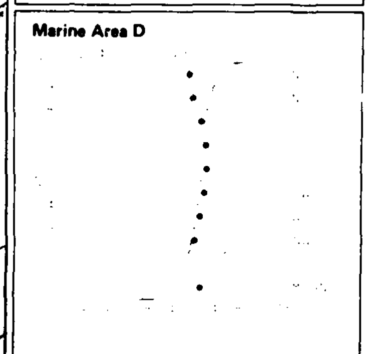


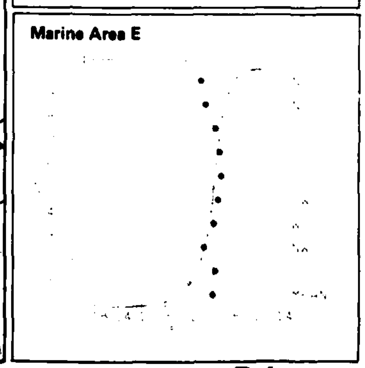










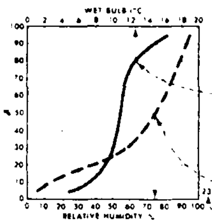


3 Air temperature mean and thresholds

February

Legend

Wet bulb/relative humidity



Cumulative percent frequency of wet bulb temperatures equal to or less than the temperature intersected by the curve (top scale)

Wet bulb (°C)

80% of all observed wet bulb temperatures were ≤12.5°C or 54.5°F)

Cumulative percent frequency of relative humidities equal to or less than the humidity intersected by the curve (bottom scale)

Relative humidity (%)

50% of all observed relative humidities were ≤74%.

Number of observations

Map - Mean dew point temperature

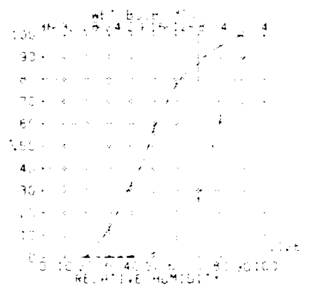
BLACK LINE Mean dew point temperature (°C)

The observation count of the graph reflects those observations reporting both air and wet bulb temperatures, both are required in computing the relative humidity. The percentage of observations of either element greater than a given value can be obtained by subtracting the cumulative percent frequency of that value from 100%.

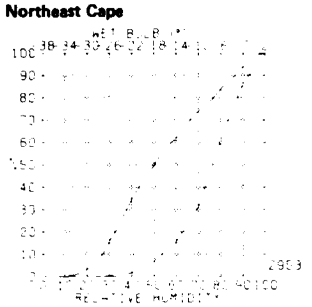
Buhta Providenjya

Insufficient Data

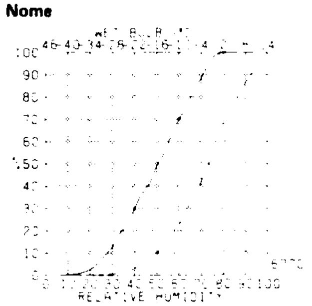
Gambell



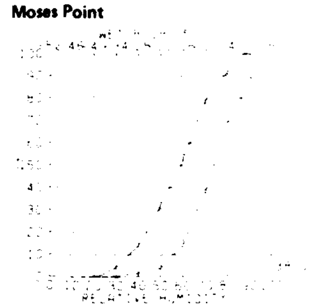
Northeast Cape



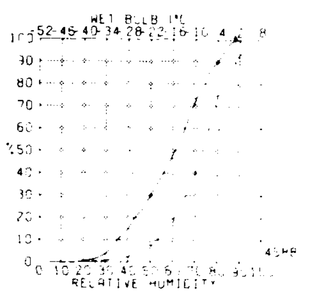
Nome



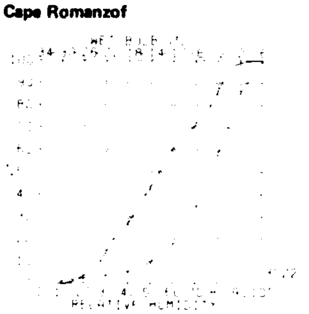
Moses Point



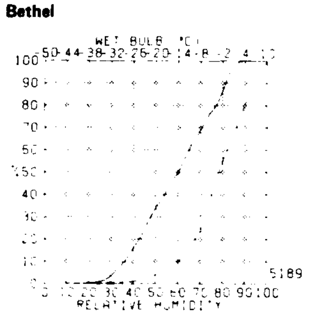
Unalakleet



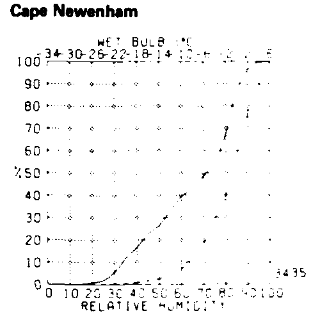
Cape Romanzof



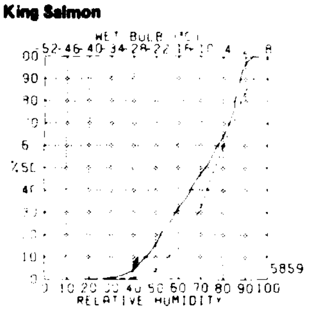
Bethel



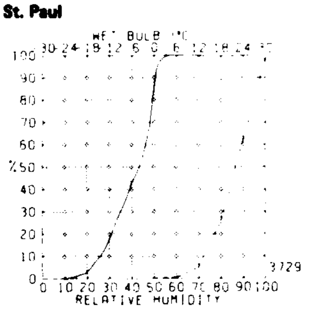
Cape Newenham



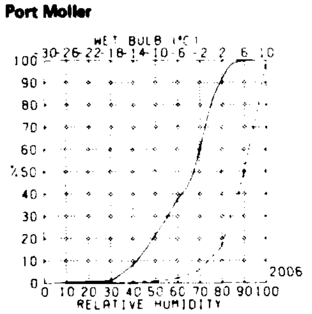
King Salmon



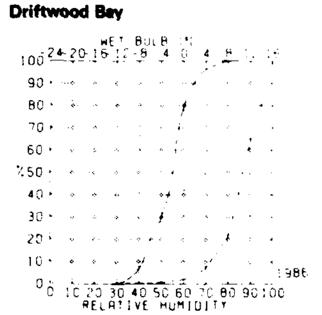
St. Paul

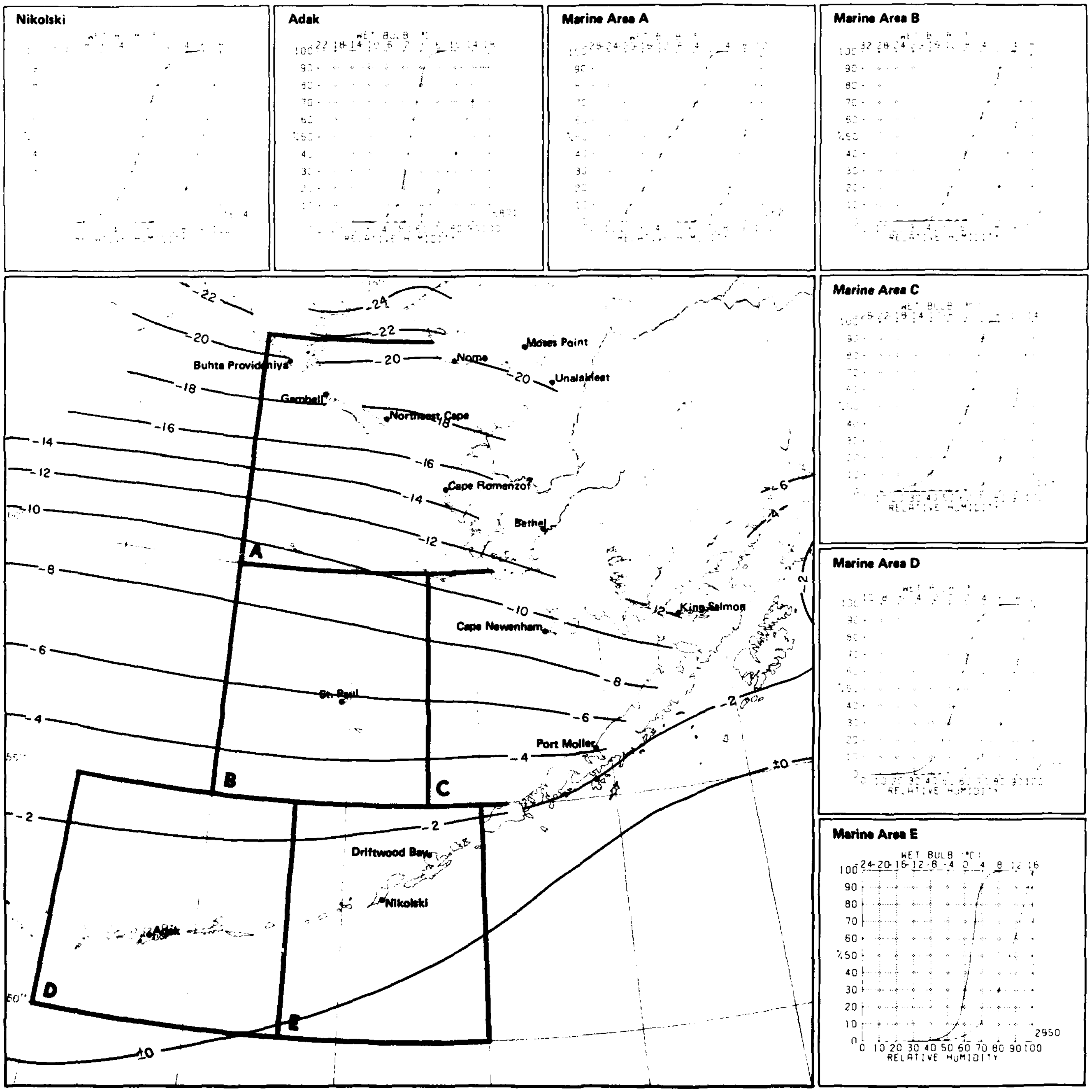


Port Moller



Driftwood Bay





4 Mean dew point temperature **February**

Legend

Air temperature/wind speed

WIND SPEED kts

[illegible]

3550

Percent frequency of simultaneous occurrence of specified temperature (°C) and wind speed (knots)

- *1% of all observations reported temperature 2.3 C simultaneously with wind speed of 22-33 kts*

• Indicates < 5% but > 0

Number of observations

Map - Air temperature extremes (°C)

BLACK LINE Maximum 99% air temperature 1% of temperatures were greater than the given value

BLUE LINE Minimum 1% air temperature 1% of temperatures were equal to or less than the given value

The graph can be used to determine the extent of human discomfort from the combined effects of extreme heat or cold and winds or to estimate the likelihood of superstructure icing. Icing potential increases as the air temperature drops below freezing and the winds increase above 10 knots (12 mph) and may become quite severe with temperatures equal to or less than -9°C (16°F) and winds equal to or greater than 34 knots (39 mph).

Buhta Providenya

[illegible]

Gambell

WIND SPEED (KTS)

[illegible]

1126

Northeast Cape

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥34
6.7	0	0	•	•	0
4.5	0	0	•	•	•
2.3	•	•	•	•	•
0.1	•	•	[illegible]	[illegible]	•
-2.-1	•	•	2	1	•
-4.-3	•	1	2	1	•
-6.-5	•	•	2	1	•
-8.-7	1	2	2	1	•
-10.-9	1	2	2	•	•
-12.-11	1	2	2	•	0
≤-13	23	26	16	1	•

3027

Nome

WIND SPEED (KTS)

[illegible]

6768

Moses Point

WIND SPEED (KTS)

[illegible]

Unalakleet

WIND SPEED (KTS)

[illegible]

4694

Cape Romanzof

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥34
8.9	•	0	0	0	0
6.7	•	•	•	0	0
4.5	•	•	•	•	0
2.3	•	1	1	•	0
0.1	1	1	2	1	0
-2.-1	1	2	5	2	•
-4.-3	1	2	4	1	•
-6.-5	1	1	2	1	•
-8.-7	2	1	2	1	•
-10.-9	1	1	2	1	•
≤-11	8	12	19	14	4

3073

Bethel

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥34
6.7	0	•	•	0	0
4.5	1	•	1	•	0
2.3	•	1	2	1	•
0.1	•	2	2	1	•
-2.-1	•	3	3	1	•
-4.-3	•	3	1	•	0
-6.-5	•	2	2	•	0
-8.-7	1	3	3	•	0
-10.-9	•	3	2	•	0
-12.-11	•	4	3	•	0
≤-13	4	22	24	4	•

5189

Cape Newenham

WIND SPEED (KTS)

[illegible]

3438

King Salmon

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥34
8.9	0	•	0	•	0
6.7	0	•	•	•	•
4.5	•	•	1	1	•
2.3	•	3	5	2	•
0.1	1	4	4	1	•
-2.-1	1	14	3	1	•
-4.-3	1	3	•	•	0
-6.-5	1	3	1	•	0
-8.-7	2	•	2	•	0
-10.-9	1	2	1	•	0
≤-11	10	20	14	1	0

[illegible]857

St. Paul

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥34
26.27	0	0	0	•	0
24.25	0	0	0	0	0
22.23	0	0	0	0	0
20.21	0	0	0	0	0
18.19	0	0	0	0	0
16.17	0	0	0	0	0
14.15	0	0	0	0	0
12.13	0	0	0	0	0
10.11	0	0	0	0	0
8.9	0	0	0	0	0
≤7	2	17	46	30	6

3952

Port Moller

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥34
8.9	•	•	•	0	0
6.7	•	•	1	0	•
4.5	1	2	1	•	0
2.3	2	5	2	1	•
0.1	3	6	5	1	0
-2.-1	6	10	3	1	0
-4.-3	4	5	1	•	0
-6.-5	2	3	1	0	0
-8.-7	2	5	2	•	0
-10.-9	1	3	2	•	0
≤-11	2	11	5	•	0

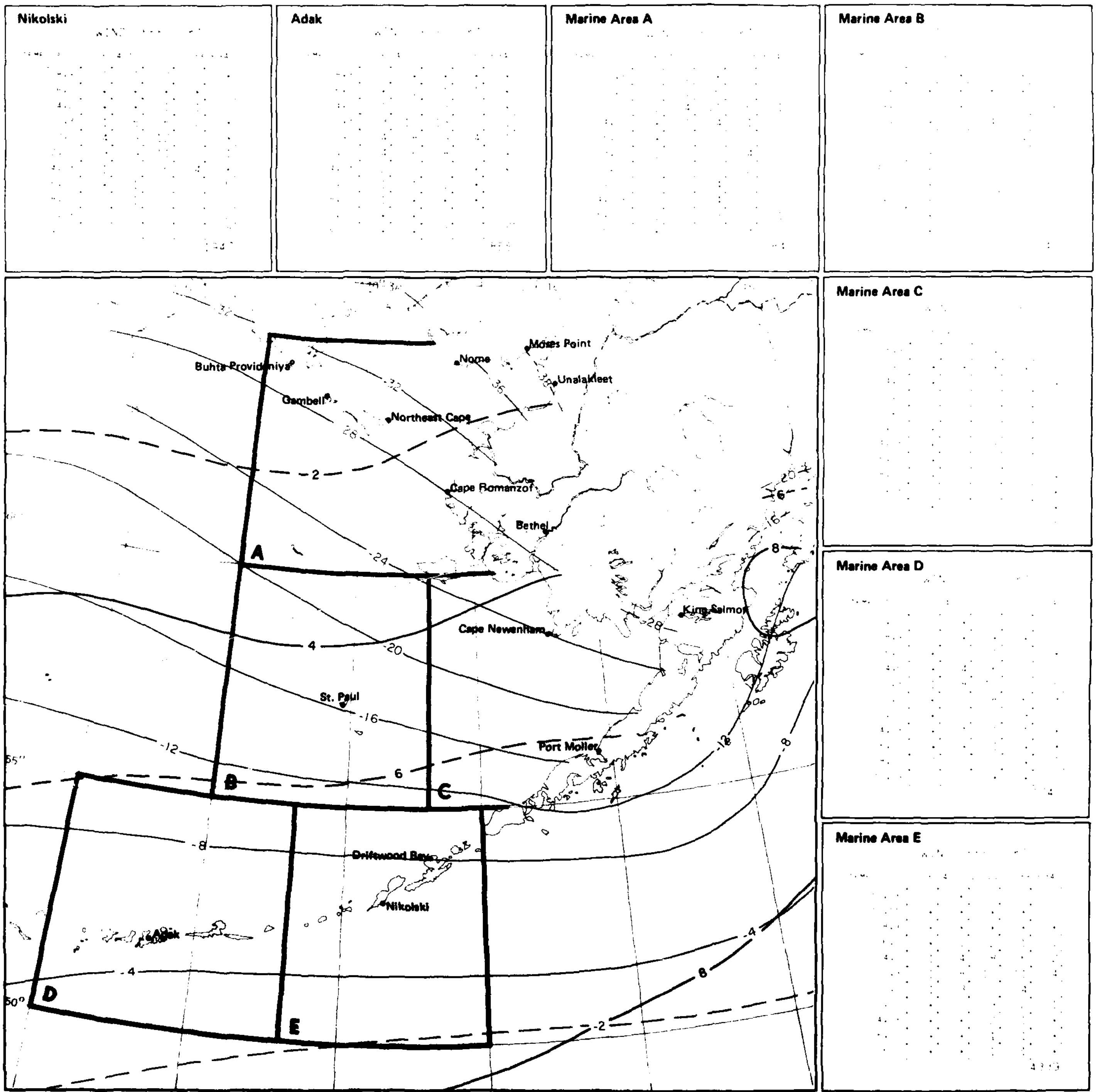
2020

Driftwood Bay

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥34
12.13	0	0	0	•	0
10.11	0	0	•	•	0
8.9	•	0	1	0	0
6.7	1	1	1	1	0
4.5	1	1	1	•	•
2.3	2	5	4	1	•
0.1	5	9	4	1	0
-2.-1	5	13	8	1	•
-4.-3	2	7	3	•	•
-6.-5	1	6	3	•	0
≤-7	1	6	5	1	0

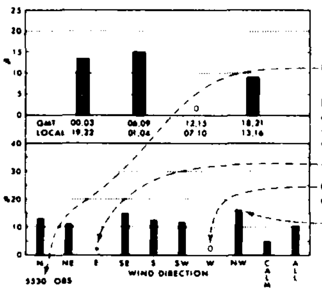
2128



5 Air temperature extremes (°C) **February**

Legend

Fog/time and fog/wind direction



— Number of observations

Bar graphs represent percent frequency of Fog (without precipitation) for various hour groupings and wind directions. Data are based on 100% for each hour-group and direction category

— • indicates < 05% but > 0

— 0 indicates no fog occurred with the wind direction

— (Data show that 17% of all NW winds were accompanied by Fog (without precipitation))

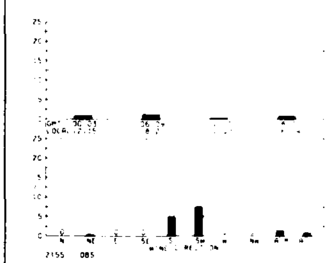
Map · Fog

BLACK LINE · Percent frequency of occurrence of all fog

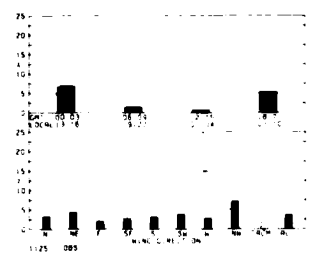
BLUE LINE · Percent frequency of fog occurring without precipitation

The percent frequency of observations reporting fog with precipitation for a given point can be determined by computing the difference between the two analyses

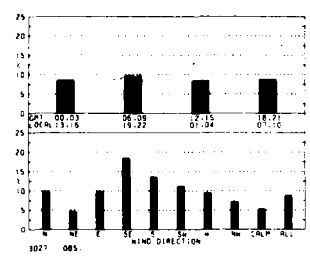
Buhta Providenlya



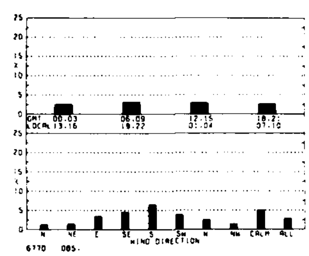
Gambell



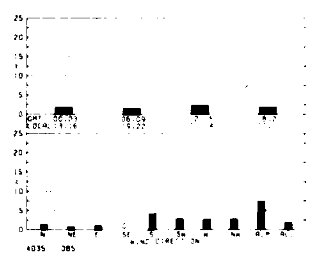
Northeast Cape



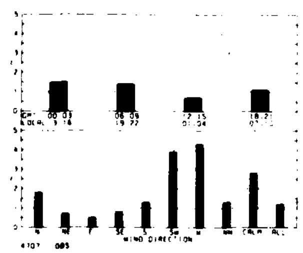
Nome



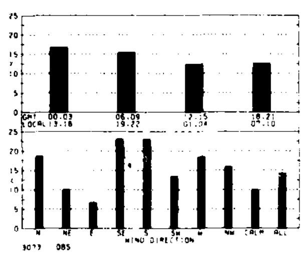
Moses Point



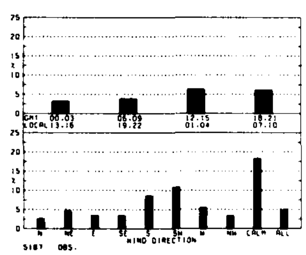
Unalakleet



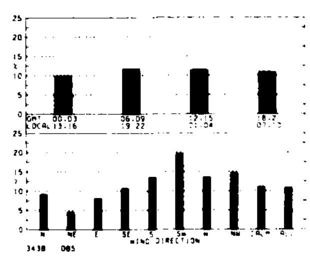
Cape Romanzof



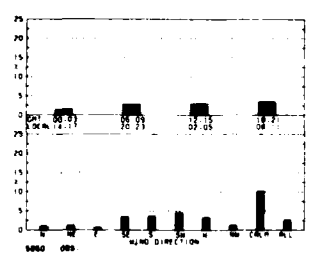
Bethel



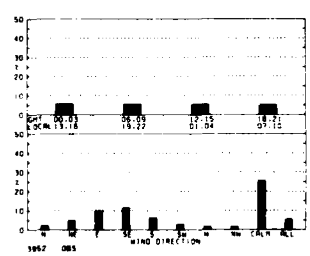
Cape Newenham



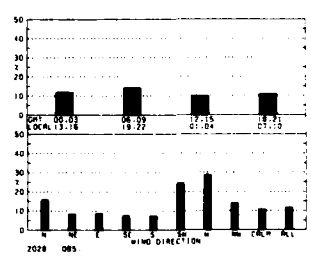
King Salmon



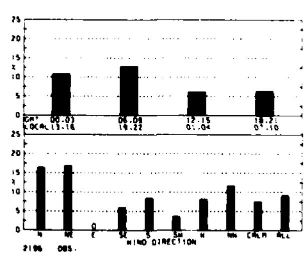
St. Paul

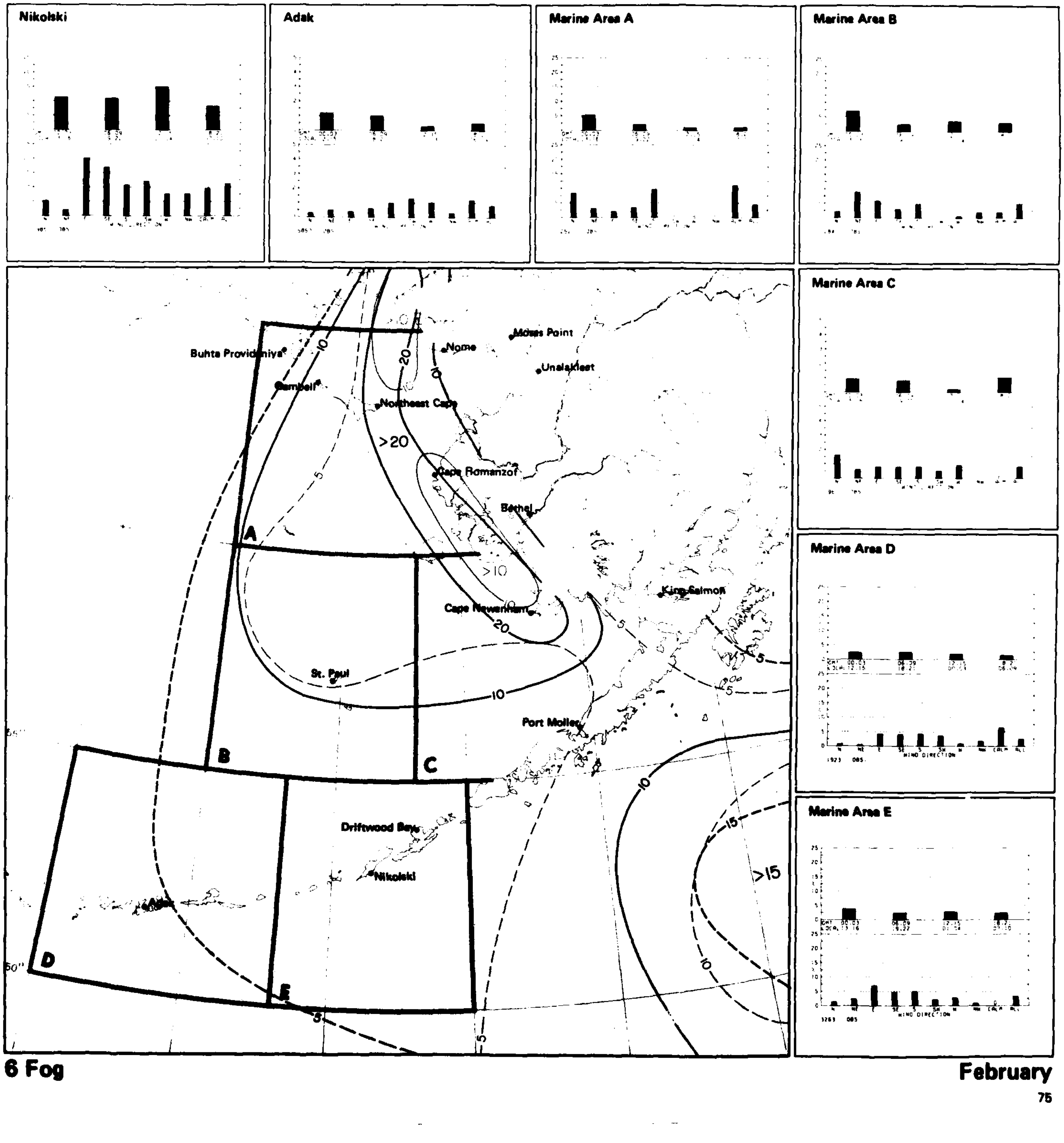


Port Moller



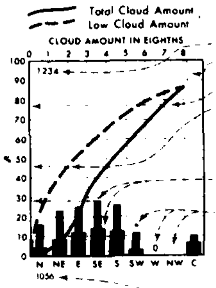
Driftwood Bay





6 Fog **February**

Legend — Cloud cover/wind direction



Cumulative percent frequency of indicated cloud amount equal to or less than the amount intersected by the curve

Number of total cloud observations

Obscurations

(77% of all total cloud amounts were ≤7 8)

(46% of all low cloud amounts were ≤2 8)

Low cloud amount Percent frequency of observations from each direction and calm that were accompanied by low cloud amounts ≥5 8 and ≥7 8 Low clouds are clouds with bases <8000 feet

(28% of all SE winds were accompanied by low cloud amounts ≥5 8 and 14% by low cloud amounts ≥7 8)

An asterisk indicates that the percentage is based on 10-30 observations of wind direction, total and low cloud amount 0 replaces bar graph when no low cloud amounts ≥5/8 were observed with a wind direction or calm 0 or bar is omitted when number of observations of total and low cloud amount from a wind direction or calm is less than 10

Number of low cloud observations

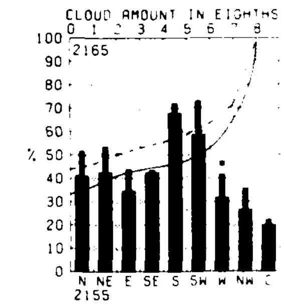
Map · Cloud amount thresholds

BLACK LINE Percent frequency of total cloud amount ≤2 8

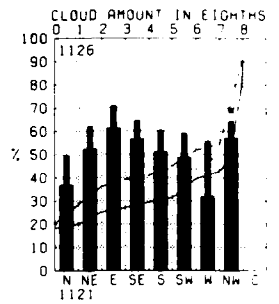
BLUE LINE Percent frequency of low cloud amount ≥5 8

Since the number of observations reporting low cloud amount is usually less than that for total cloud amount, somewhat different samples may be used to compute the two curves on the graph. This may lead to inconsistencies where low cloud amount appears higher than the total cloud amount. Where this occurred the graph was adjusted in favor of the total cloud by making the curves coincide. The frequency of obscured conditions may be determined by subtracting the cumulative percent frequency corresponding to 8 8 coverage from 100%. In computing the bar graph, obscurations are considered as 8 8 coverage

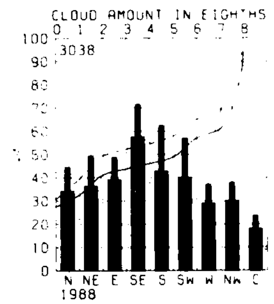
Buhta Provideniya



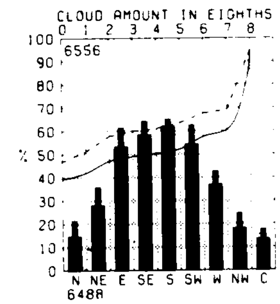
Gambell



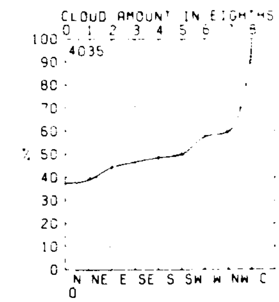
Northeast Cape



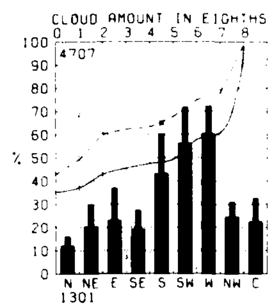
Nome



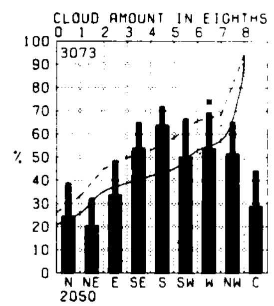
Moses Point



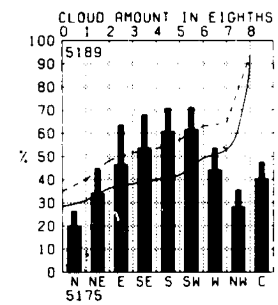
Unalakleet



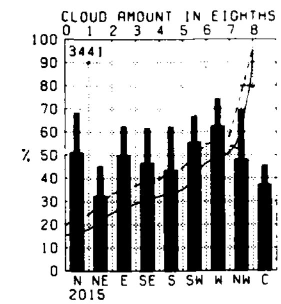
Cape Romanzof



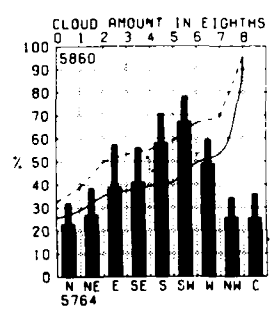
Bethel



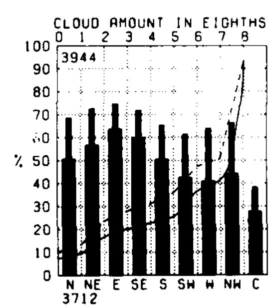
Cape Newenham



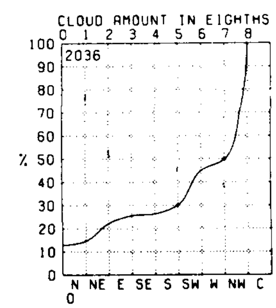
King Salmon



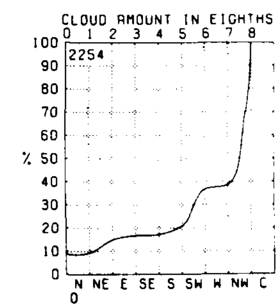
St. Paul

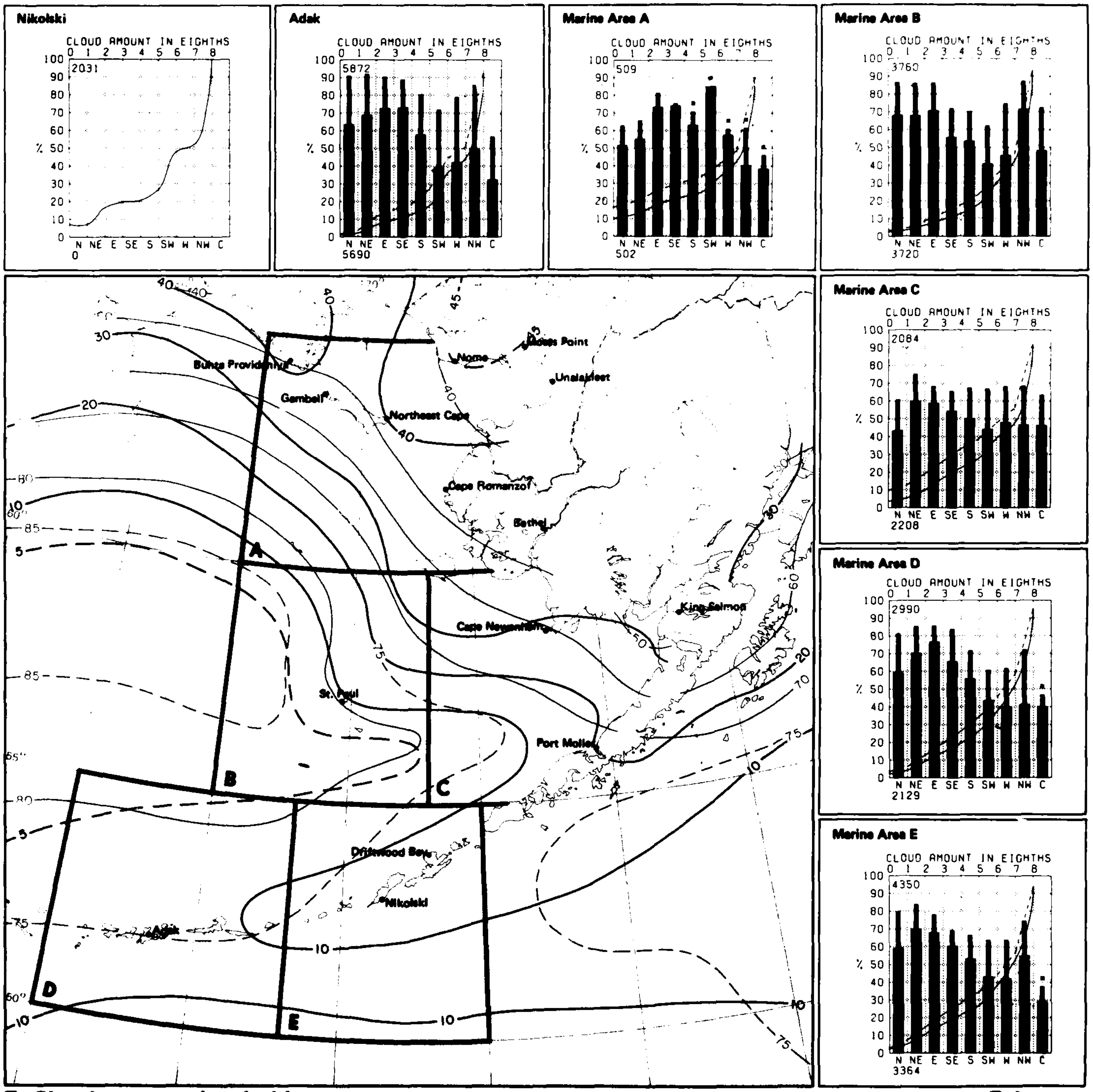


Port Moller



Driftwood Bay



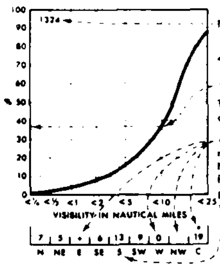


7 Cloud amount thresholds

February

Legend

Visibility/wind direction



Number of observations

Cumulative percent frequency of visibilities less than the visibility intersected by the curve

(37% of all visibilities reported were <10 nautical miles.)

The table below the graph indicates percent frequency of occurrence of visibility <2 nautical miles versus wind direction

• indicates < 5% but >0 0 indicates that no visibilities <2 nautical miles were observed with winds from a direction or calm. No percentage is given if less than 10 observations were available for visibility and wind direction. An asterisk indicates that the percentage was based on 10-30 observations of visibility and wind direction

(13% of all S winds were accompanied by visibilities <2 nautical miles.)

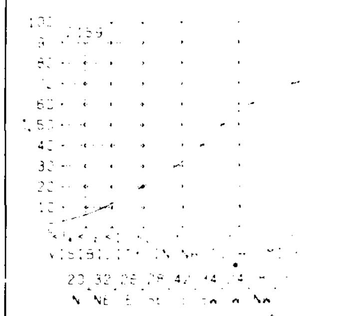
Map - Visibility thresholds

BLACK LINE Percent frequency of visibilities ≥5 nautical miles

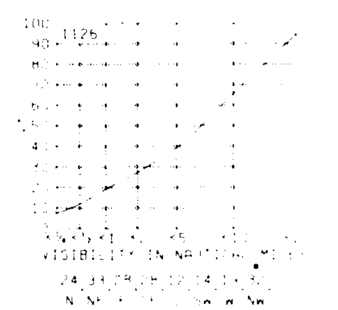
BLUE LINE Percent frequency of visibilities <2 nautical miles

The percentage of visibility equal to or greater than a given value can be obtained from the graph by subtracting the cumulative percent frequency of that value from 100%. Visibility at sea is difficult to measure because of the lack of reference points. Also, some observers seem to report reduced visibilities at night because of darkness, though this tendency has abated in recent years. The coarseness of the coding intervals, however, tends to minimize serious biases in the summarized data. Visibilities greater than 25 nmi should be interpreted cautiously because the earth's curvature makes it impossible to see 25 nmi horizontally from the bridges of most ships.

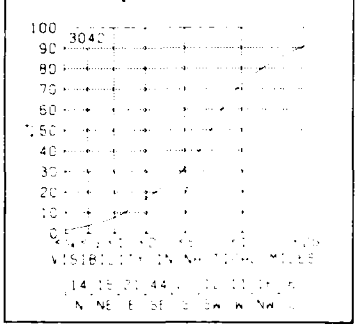
Buhta Provideniya



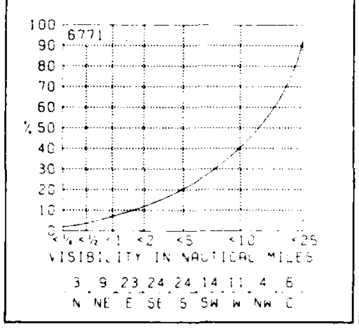
Gambell



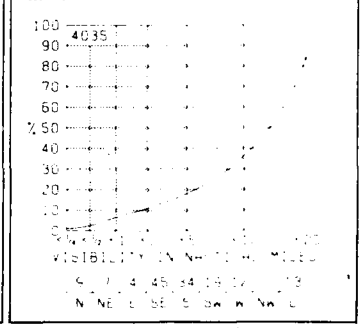
Northeast Cape



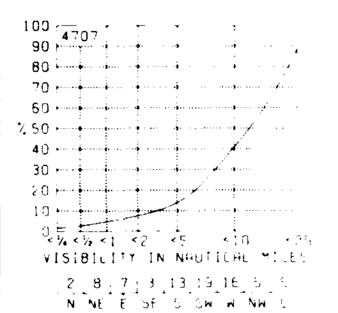
Nome



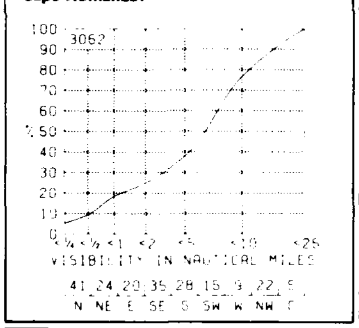
Moses Point



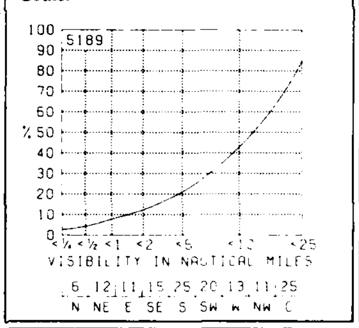
Unalakleet



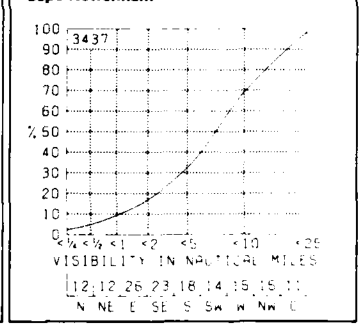
Cape Romanzof



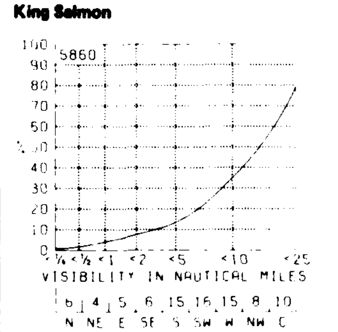
Bethel



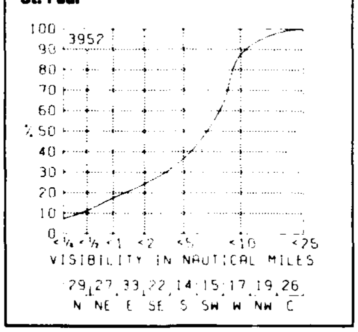
Cape Newenham



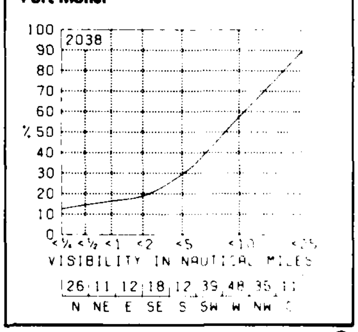
King Salmon



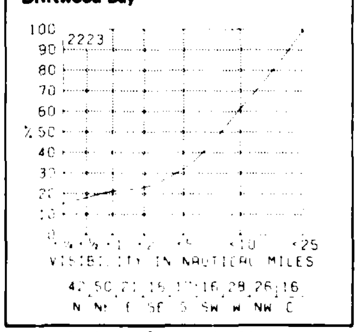
St. Paul

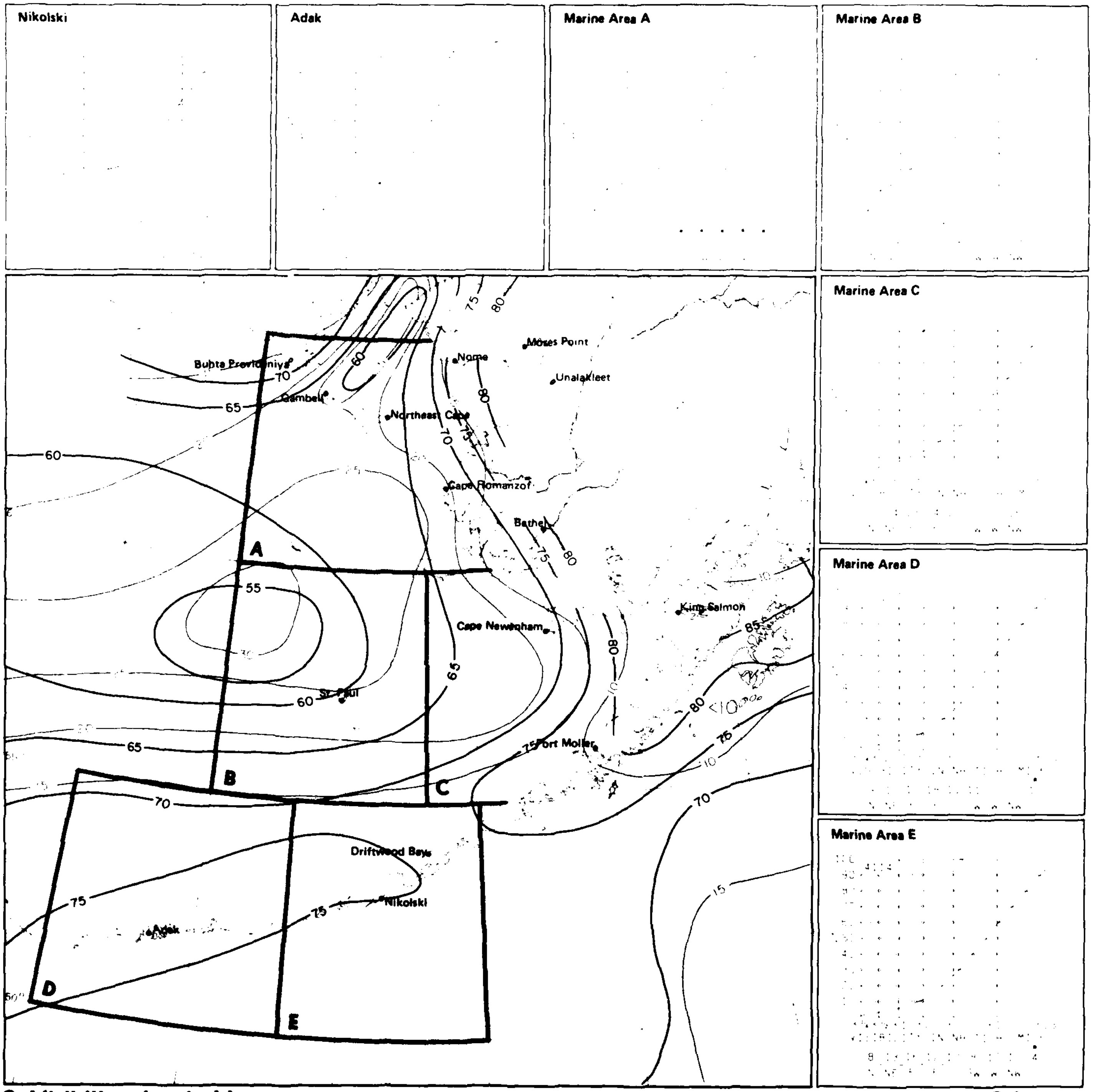


Port Moller



Driftwood Bay





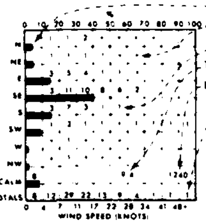
8 Visibility thresholds

February

Legend

Wind speed/direction

Direction frequency (top scale) Bars represent percent frequency of winds observed from each direction. Speed frequency (bottom scale) Printed figures represent percent frequency of wind speeds observed from each direction



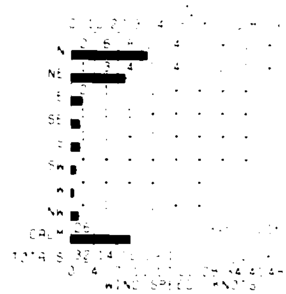
Map - Wind speed thresholds

BLACK LINE - Percent frequency of wind speed ≤10 knots (≤12 mph)

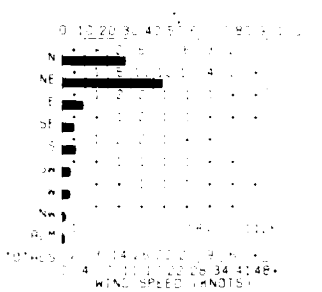
BLUE LINE Percent frequency of wind speed ≥34 knots (≥39 mph)

The scalar mean wind speed on the graph is based on the number of observations reporting a wind speed with direction. The sum of the totals line provides the cumulative percent frequency of wind speed below a selected threshold value. In the example graph, 71% of all winds were less than 17 knots (20 mph)

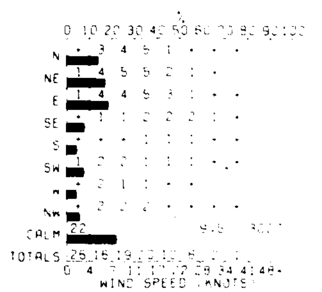
Buhta Provideniya



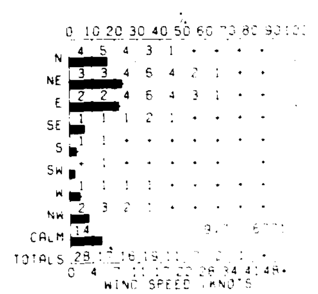
Gambell



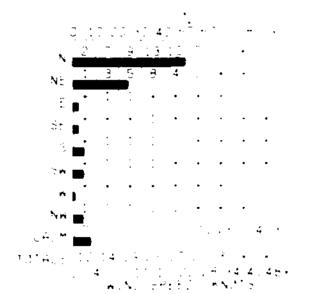
Northeast Cape



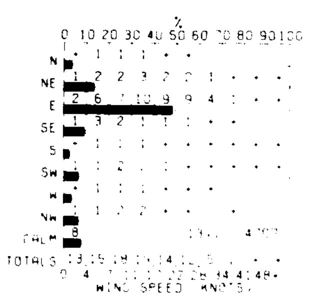
Nome



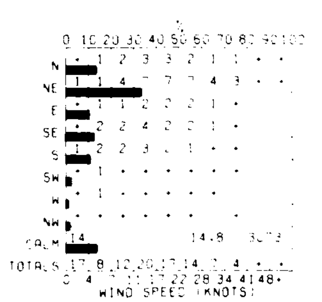
Moses Point



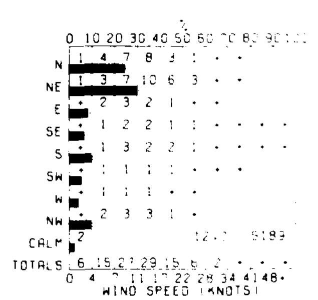
Unalakleet



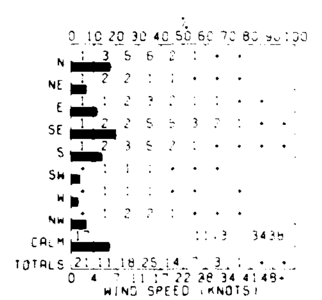
Cape Romanzof



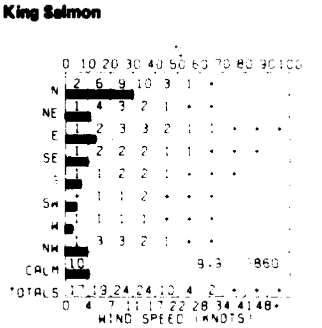
Bethel



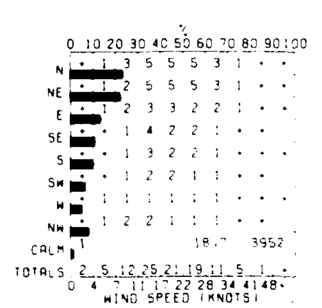
Cape Newenham



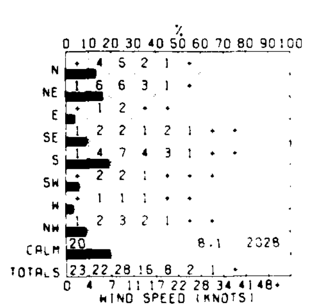
King Salmon



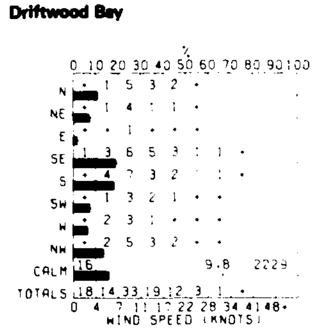
St. Paul

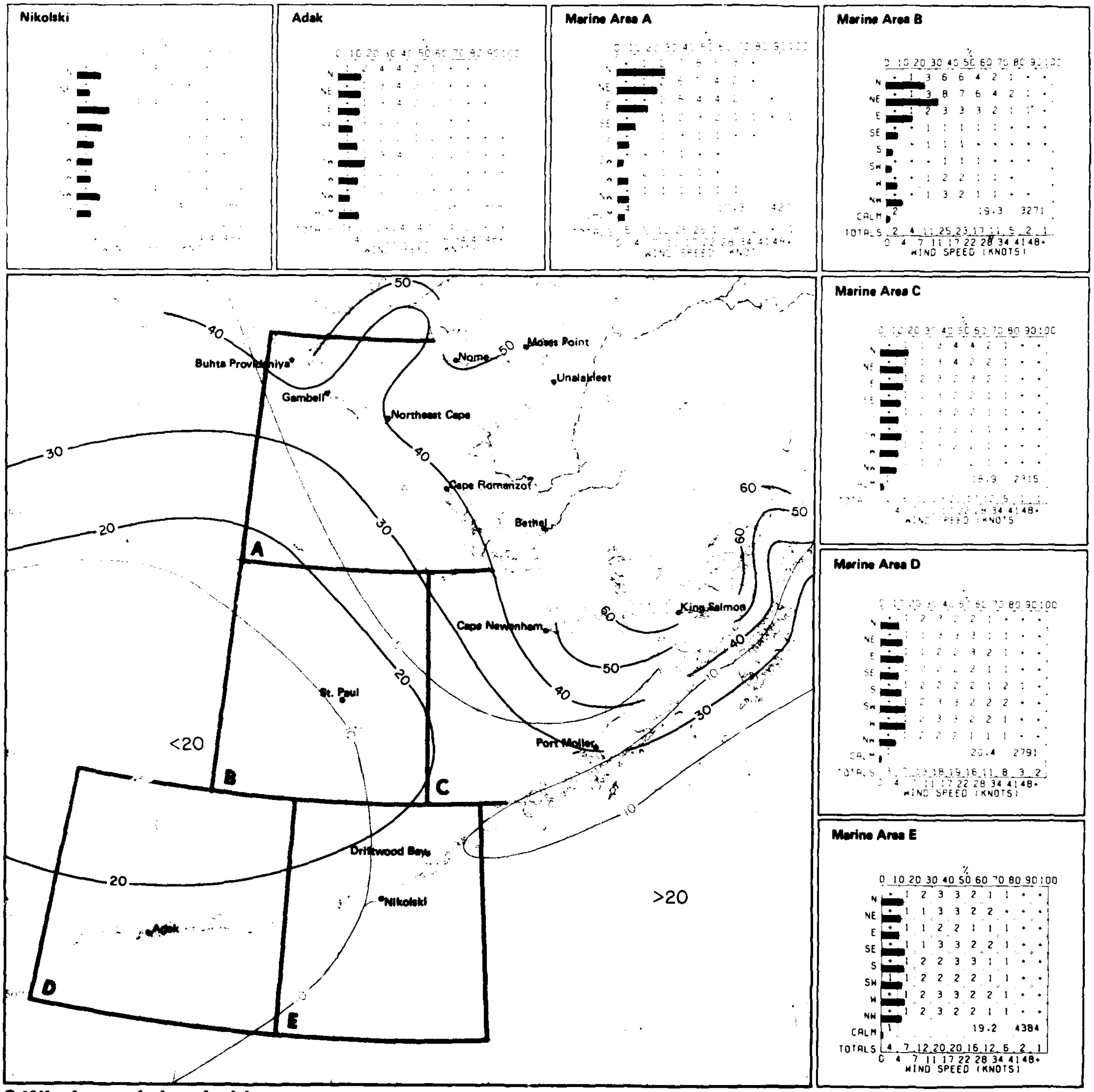


Port Moller



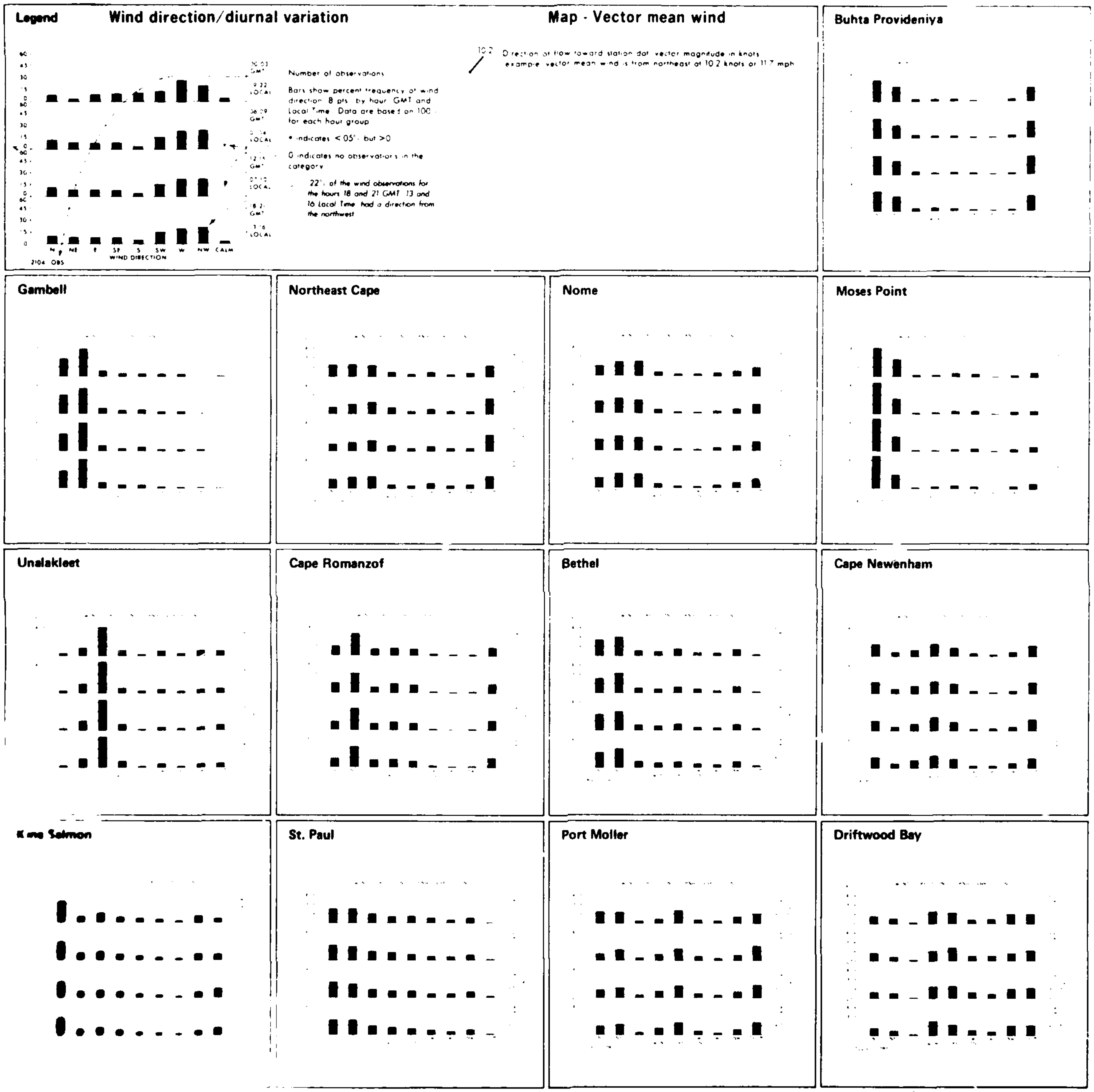
Driftwood Bay



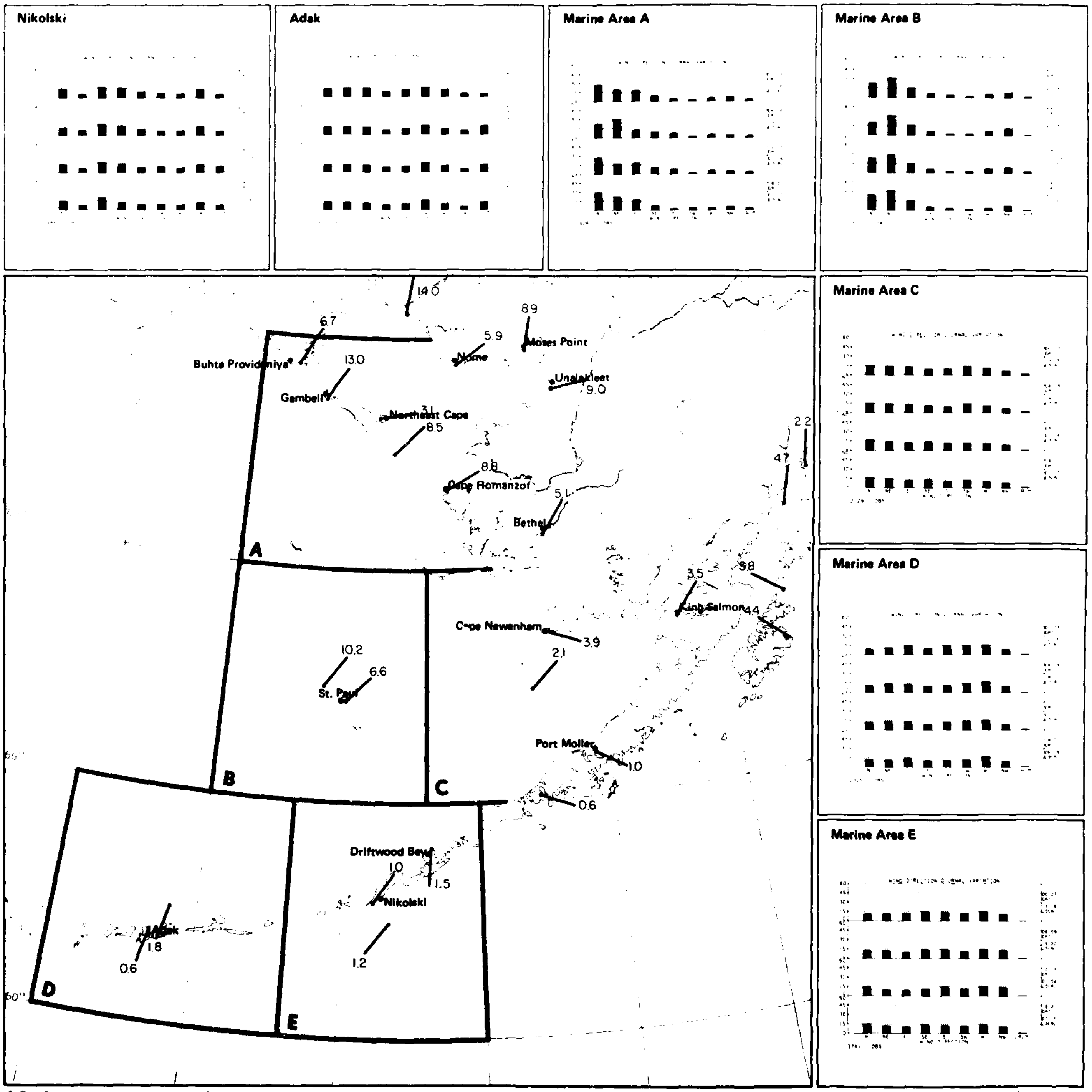


9 Wind speed thresholds

February



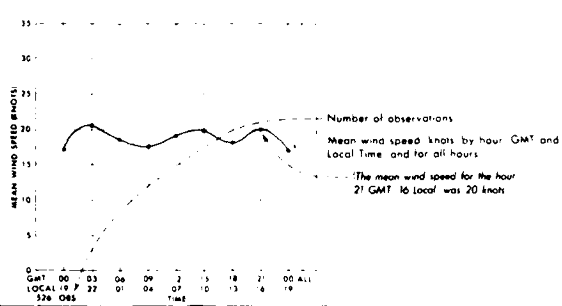
10 Wind direction/diurnal variation



10 Vector mean wind

February

Legend **Wind speed/diurnal variation**

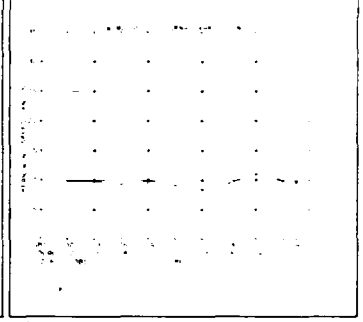


Map - Scalar mean wind

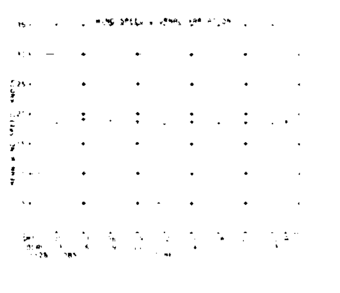
BLACK LINE Scalar mean wind knots

In areas of high persistence of direction the magnitude of the vector mean winds should closely approach that of the scalar mean winds. As most of the marine observations are recorded at six hour intervals disregard the plots for other than 00 06 12 18 GMT hours on the marine area graphs.

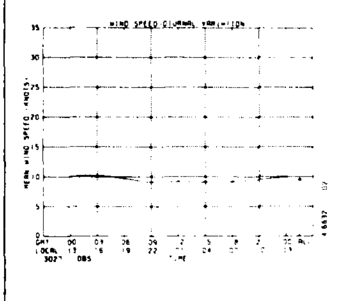
Buhta Provideniya



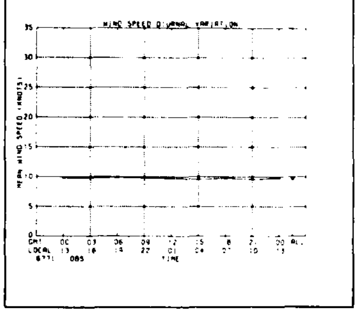
Gambell



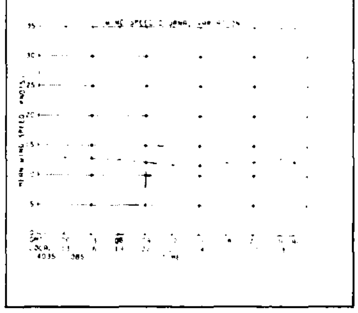
Northeast Cape



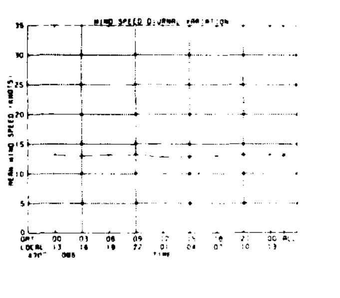
Nome



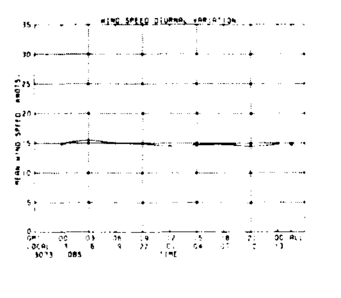
Moses Point



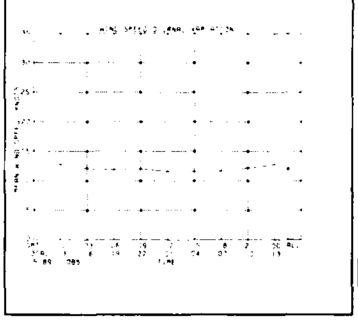
Unalakleet



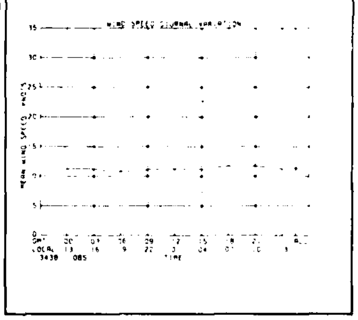
Cape Romanzof



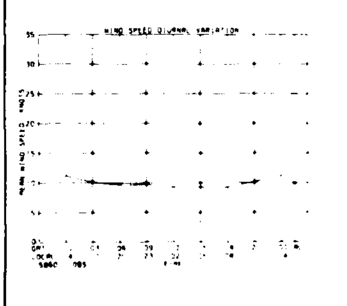
Bethel



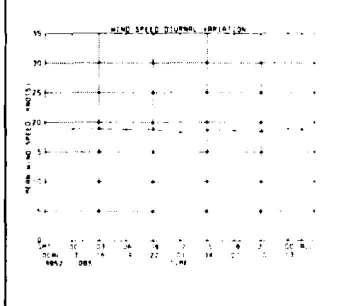
Cape Newenham



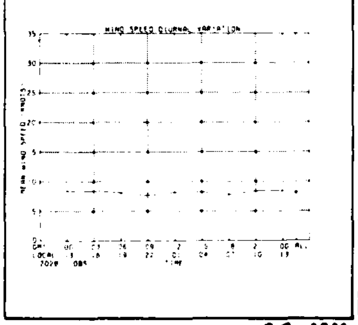
King Salmon



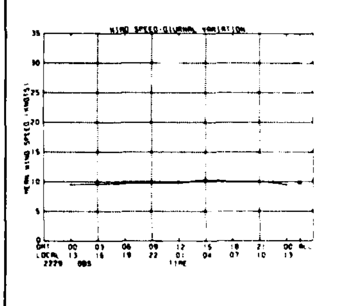
St. Paul

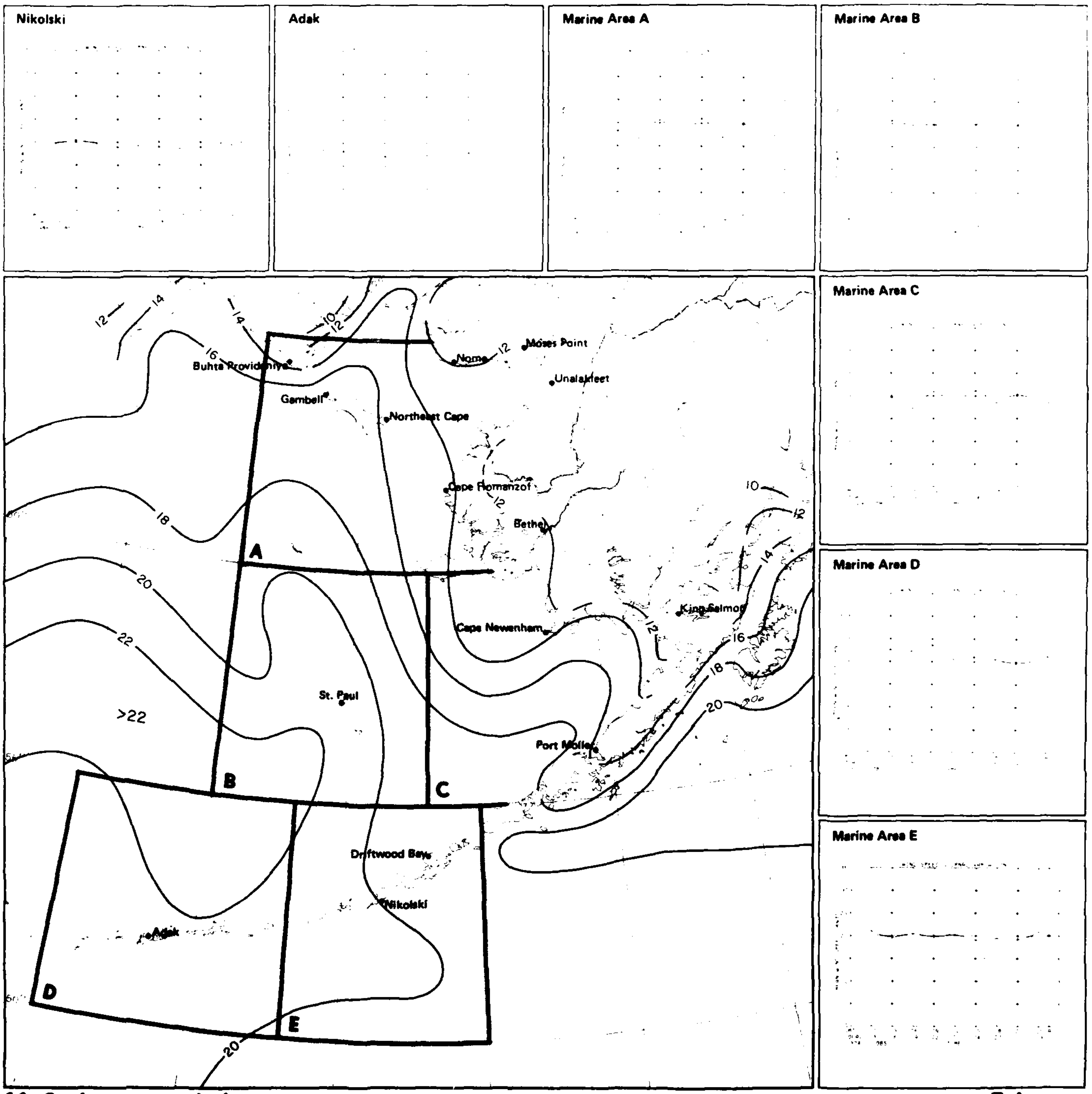


Port Moller



Driftwood Bay

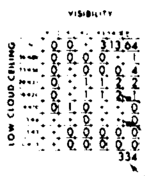




11 Scalar mean wind **February**

Legend

Low cloud ceiling/visibility



Percent frequency of simultaneous occurrence of specified low cloud ceilings (hundreds of feet) and visibilities (nautical miles)

Low cloud ceiling heights are estimated from the height of low clouds (h) when low cloud amount (N_h) is ≥5/8

Obscurations are included under ceiling 0<1.5

NC (no ceiling) includes bases of clouds ≥8000 feet as well as occurrences of N_h <5/8

2% of all observations reported ceiling ≥1000 but <2000 feet simultaneously with visibility ≥5 but <10 nautical miles

• indicates < 5% but >0

Number of observations

Map · Low cloud ceiling and visibility thresholds

BLACK LINE Percent frequency of low cloud ceiling ≥1000 feet (or no low cloud ceiling) and visibility ≥5 nautical miles

BLUE LINE Percent frequency of low cloud ceiling <600 feet and/or visibility <2 nautical miles

Buhta Provideniya

Gambell

VISIBILITY / LOW CLOUD CEILING

	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	•	•	1	2	12	28
50<80	0	0	•	•	1	1
35<50	0	0	•	•	•	•
20<35	•	•	•	2	3	2
10<20	3	3	3	6	6	3
6<10	2	2	2	2	3	1
3<6	•	•	•	1	•	0
1.5<3	0	0	0	0	•	0
0<1.5	7	1	•	•	0	0

1121

Northeast Cape

VISIBILITY / LOW CLOUD CEILING

	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	•	•	1	3	21	31
50<80	[illegible]	0	•	•	•	1
35<50	[illegible]	0	•	•	•	•
20<35	•	•	1	2	3	1
10<20	•	1	3	6	8	2
6<10	[illegible]	1	2	2	2	•
3<6	0	•	•	•	1	0
1.5<3	0	0	0	0	•	0
0<1.5	4	2	1	•	0	0

1984

Nome

VISIBILITY / LOW CLOUD CEILING

	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	•	•	•	1	11	52
50<80	•	•	•	•	1	2
35<50	•	•	•	•	1	2
20<35	•	•	1	2	3	2
10<20	•	•	1	2	3	2
6<10	•	1	1	2	1	•
3<6	•	•	•	1	•	•
1.5<3	•	0	•	•	•	0
0<1.5	2	2	1	•	•	0

6488

Moses Point

VISIBILITY / LOW CLOUD CEILING

	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	1	0	•	1	5	56
50<80	0	0	0	0	3	5
35<50	0	0	0	0	1	•
20<35	0	•	0	•	4	1
10<20	0	•	0	4	2	•
6<10	0	0	0	0	0	0
3<6	0	0	0	0	0	0
1.5<3	0	0	0	0	0	0
0<1.5	5	5	2	1	0	0

219

Unalakleet

VISIBILITY / LOW CLOUD CEILING

	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
50<80	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
35<50	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
20<35	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
10<20	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
6<10	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3<6	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1.5<3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
0<1.5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible]

Cape Romanzof

VISIBILITY / LOW CLOUD CEILING

	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	2	3	2	5	27	16
50<80	•	•	•	•	1	1
35<50	0	•	0	•	1	•
20<35	•	•	•	1	5	1
10<20	1	1	1	3	5	1
6<10	1	2	2	2	2	•
3<6	•	•	•	•	•	0
1.5<3	0	0	•	0	0	0
0<1.5	4	3	•	•	0	0

2039

Bethel

VISIBILITY / LOW CLOUD CEILING

	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	1	•	1	1	10	45
50<80	•	•	•	•	1	3
35<50	•	•	•	•	1	3
20<35	•	•	•	1	4	4
10<20	•	•	1	3	3	2
6<10	•	•	1	1	2	1
3<6	•	•	•	1	1	•
1.5<3	•	•	•	•	•	0
0<1.5	2	2	2	1	•	0

5175

Cape Newenham

VISIBILITY / LOW CLOUD CEILING

	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	•	•	1	2	17	22
50<80	0	0	•	•	•	1
35<50	0	0	0	•	1	1
20<35	•	•	•	1	3	1
10<20	•	•	1	5	7	5
6<10	•	1	3	6	6	3
3<6	•	•	1	1	1	•
1.5<3	0	•	0	•	0	0
0<1.5	3	2	1	1	0	•

2010

King Salmon

VISIBILITY / LOW CLOUD CEILING

	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	1	•	•	1	10	50
50<80	•	•	•	•	1	4
35<50	0	•	0	•	2	3
20<35	•	•	•	1	3	5
10<20	0	•	1	1	3	3
6<10	•	•	•	1	2	1
3<6	0	•	•	•	1	•
1.5<3	•	0	0	•	•	0
0<1.5	1	2	2	1	•	0

5764

St. Paul

VISIBILITY / LOW CLOUD CEILING

	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	1	•	1	1	22	8
50<80	•	0	•	•	•	•
35<50	0	0	•	0	1	•
20<35	1	•	•	1	7	2
10<20	3	2	3	6	17	2
6<10	1	1	1	2	4	•
3<6	1	1	1	1	1	•
1.5<3	•	•	•	•	•	0
0<1.5	5	1	•	•	0	0

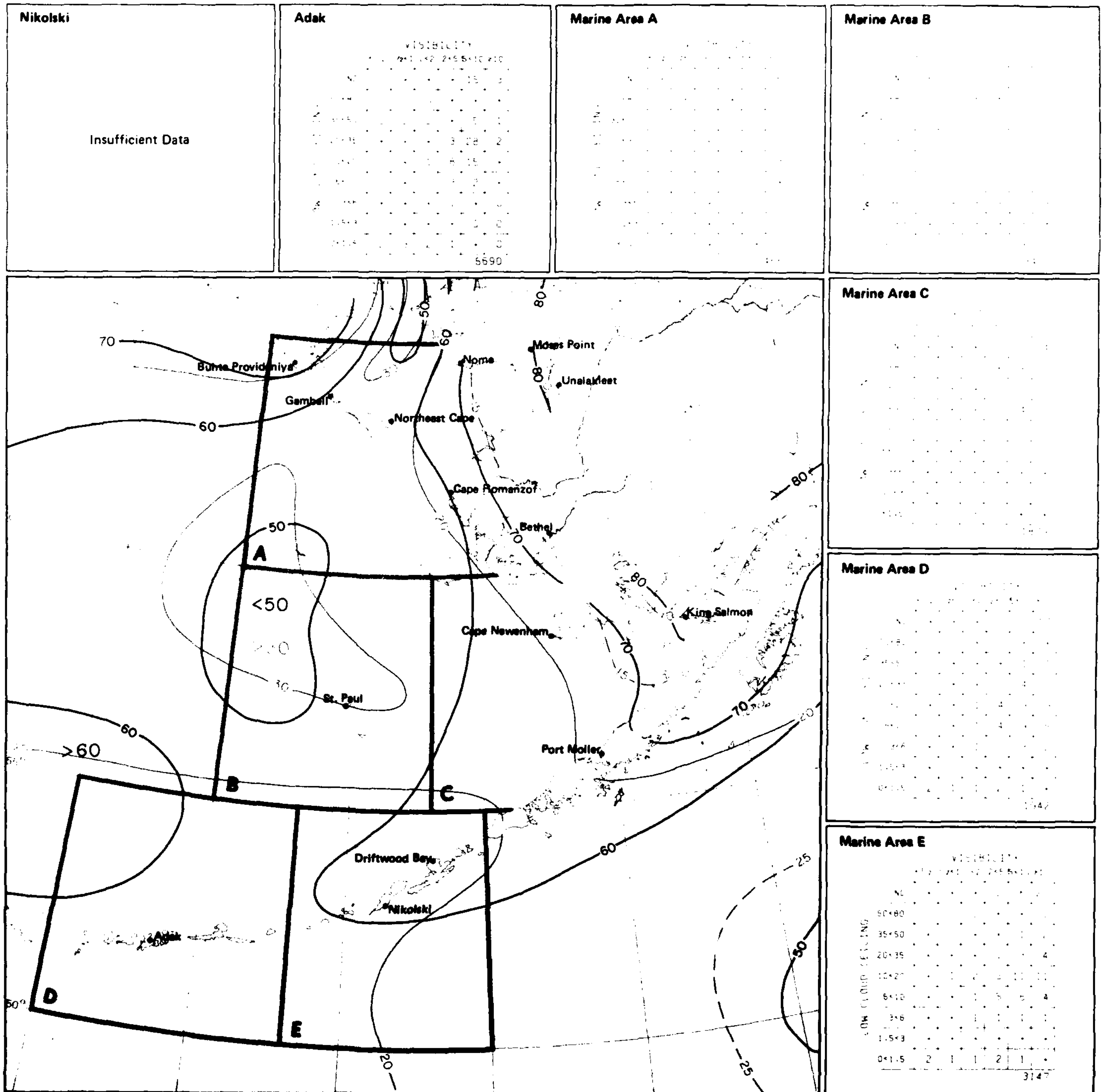
3712

Port Moller

Insufficient Data

Driftwood Bay

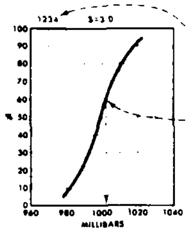
Insufficient Data



12 Low cloud ceiling and visibility thresholds **February**

Legend

Sea level pressure



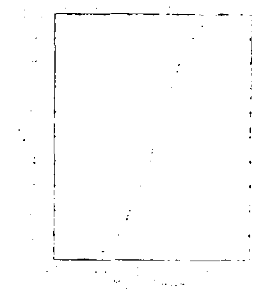
- Number of observations
- Cumulative percent frequency of sea level pressures equal to or less than the pressure intersected by the curve
- S Standard deviation of pressure (mbs)
- 60% of all observed sea level pressures were ≤1002 millibars

Map · Mean sea level pressure

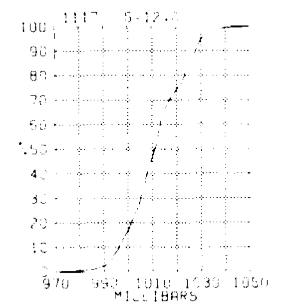
BLACK LINE Mean sea level pressure (millibars)

Sea level pressure is one of the most frequently recorded elements but one of the least accurate because of instrument and coding errors. Despite the inaccuracies of the individual readings, however, the large scale patterns and mean gradients of the isopleth analyses are relatively accurate.

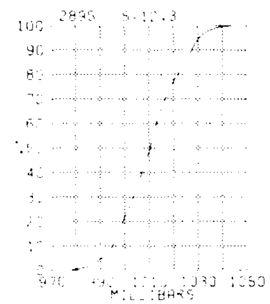
Buhta Provideniya



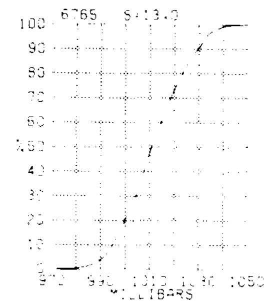
Gambell



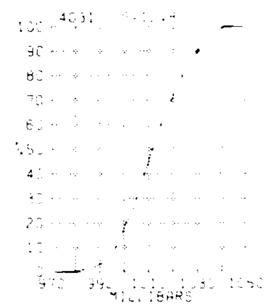
Northeast Cape



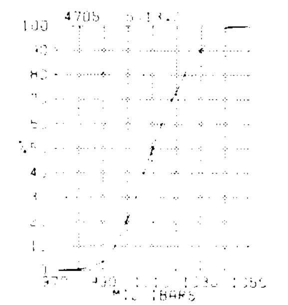
Nome



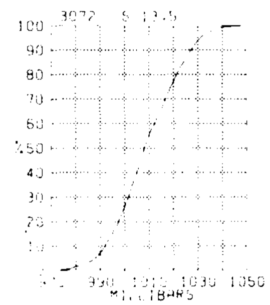
Moses Point



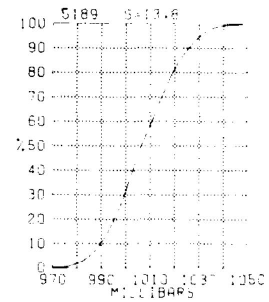
Unalakleet



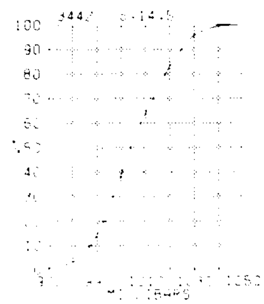
Cape Romanzof



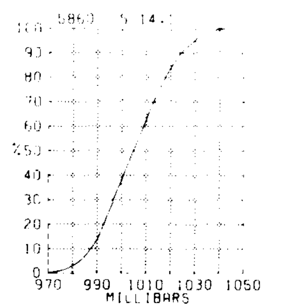
Bethel



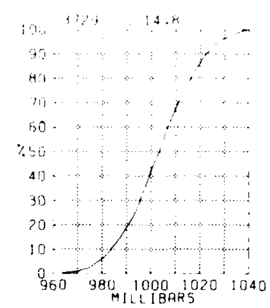
Cape Newenham



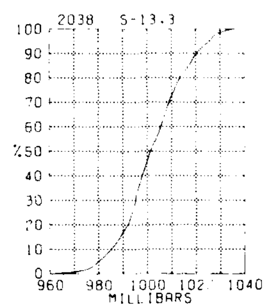
King Salmon



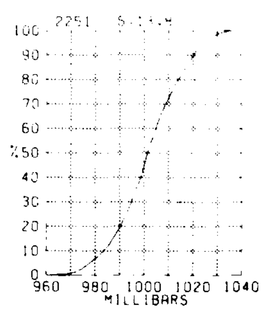
St. Paul

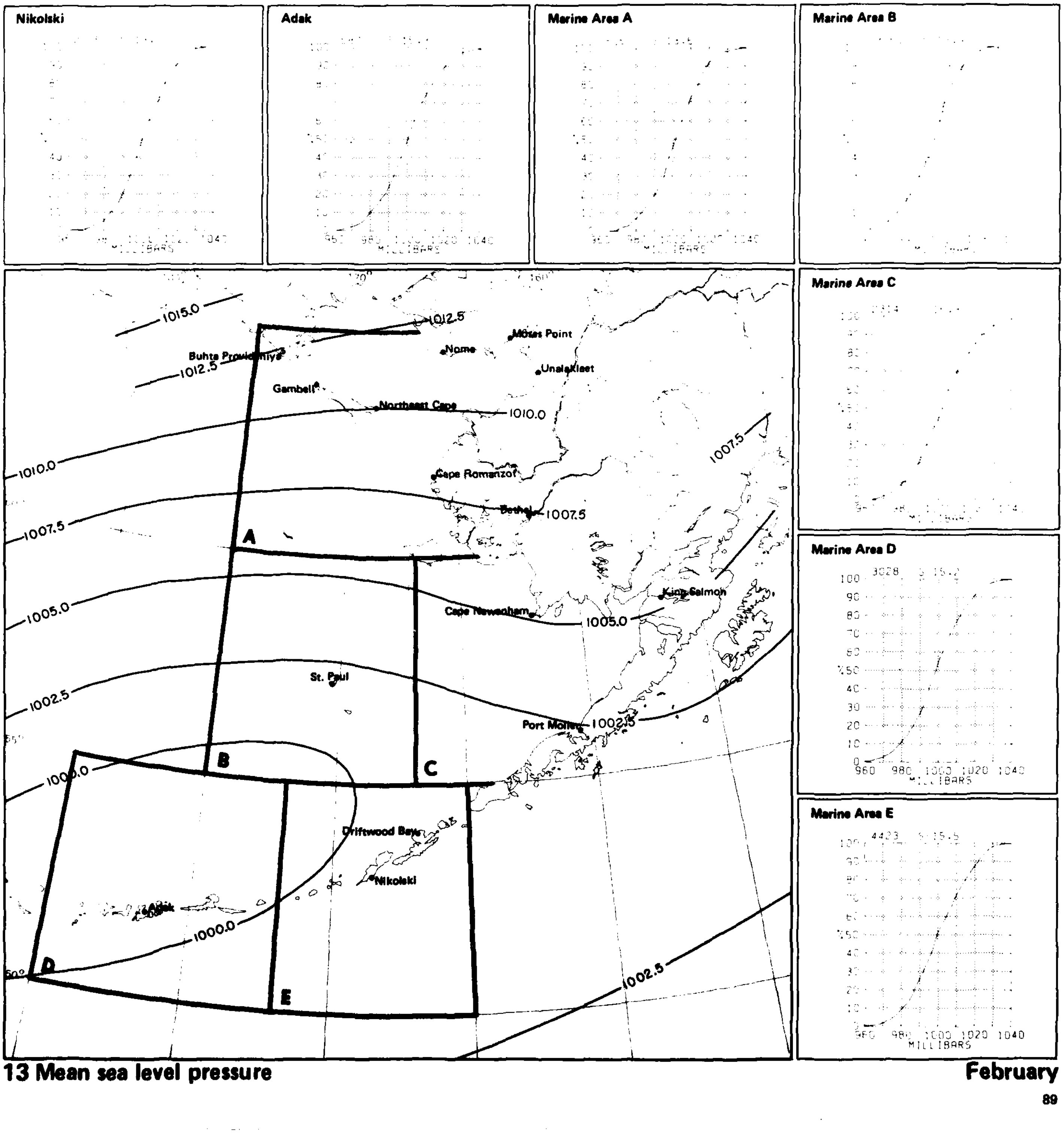


Port Moller



Driftwood Bay



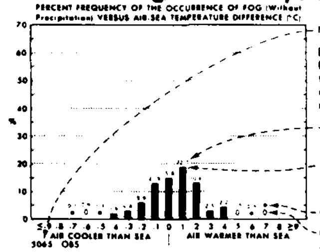


13 Mean sea level pressure

February

Legend

Fog/air-sea temperature difference



Number of observations

Bars show the percentage of observations with Fog (without Precipitation) for each Air-Sea temperature difference category. Plotted numbers indicate the percentage of observations in each Air-Sea temperature difference category

(22.7% of all observations had Air-Sea temperature difference of +1 °C)

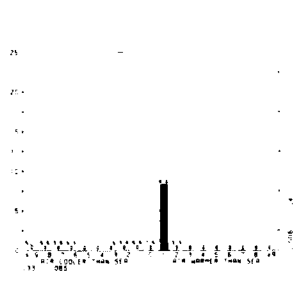
(19% of all observations with Air-Sea temperature difference of +1 °C were accompanied by Fog (without Precipitation))

+ indicates < 0.5% but >0

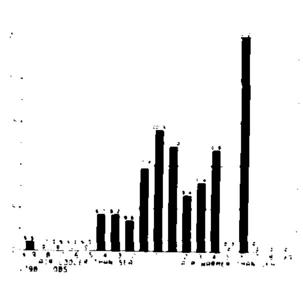
0 indicates no fog with the Air-Sea temperature difference category

BLACK LINE - Mean sea surface temperature (°C)

Marine Area A

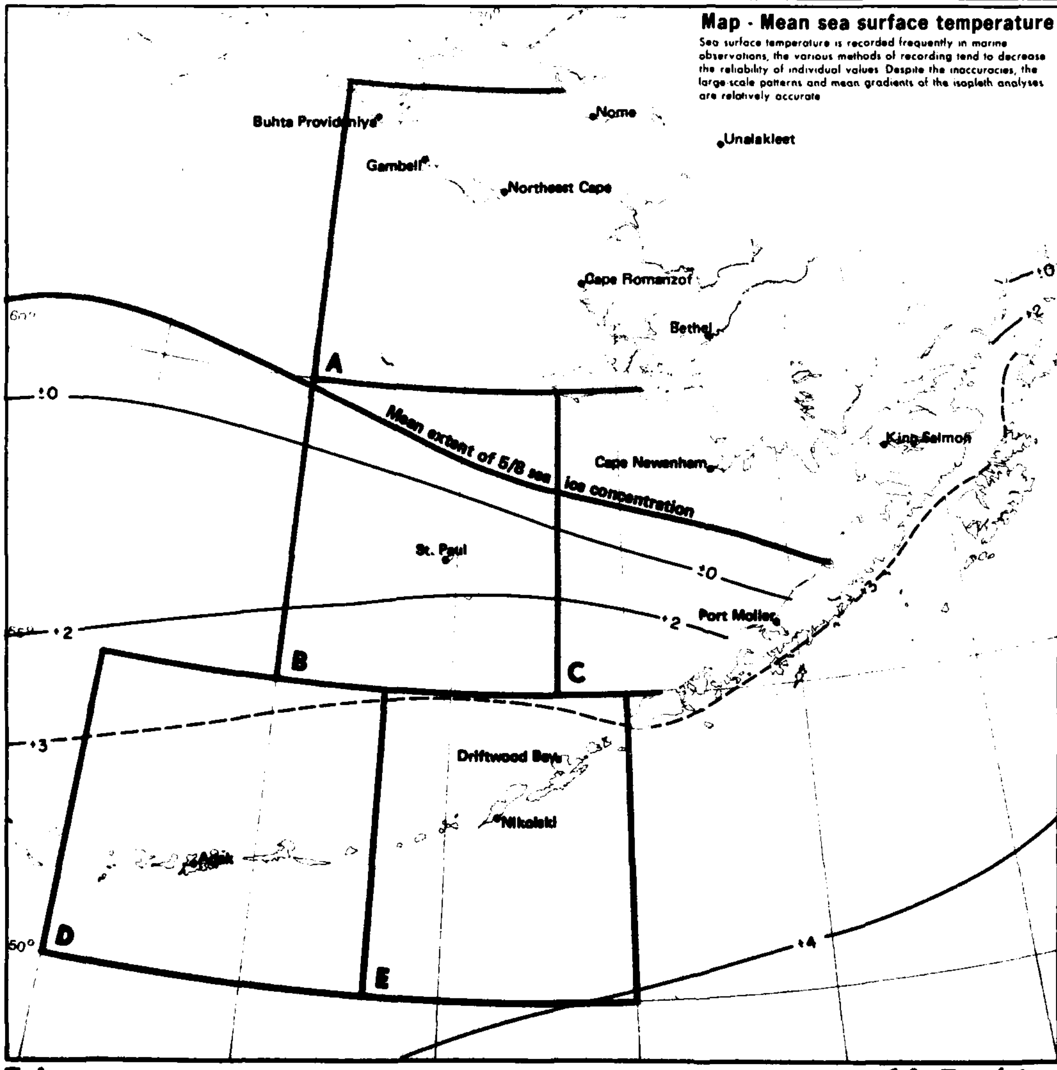


Marine Area B

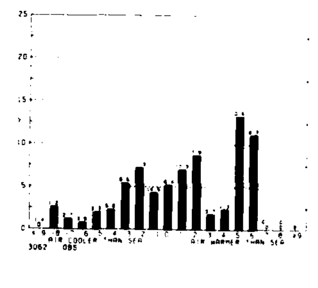


Map - Mean sea surface temperature

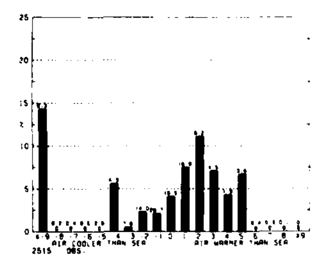
Sea surface temperature is recorded frequently in marine observations, the various methods of recording tend to decrease the reliability of individual values. Despite the inaccuracies, the large-scale patterns and mean gradients of the isopleth analyses are relatively accurate.



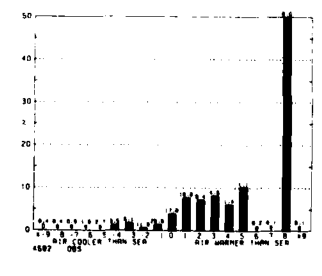
Marine Area C



Marine Area D



Marine Area E

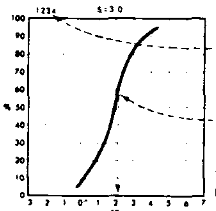


February

14 Fog/air-sea temperature difference
Mean sea surface temperature

Legend

Sea surface temperature



Number of observations

Cumulative percent frequency of sea surface temperatures equal to or less than the temperature intersected by the curve

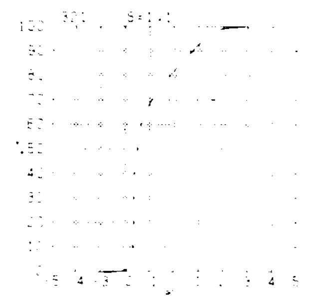
(60% of all observed sea surface temperatures were ≤2.1°C or ≤35.8°F

S: Standard deviation of sea surface temperatures (°C)

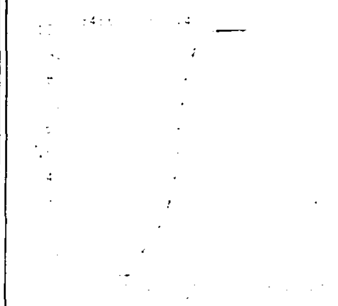
BLACK LINE Maximum (99%) sea surface temperature (°C) (1% of the temperatures were greater than the given value)

BLUE LINE Minimum (1%) sea surface temperature (°C) (1% of the temperatures were equal to or less than the given value)

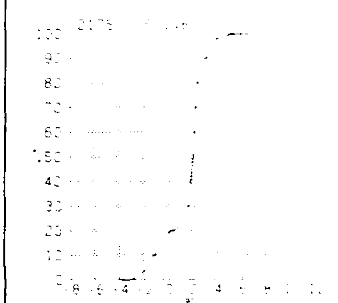
Marine Area A



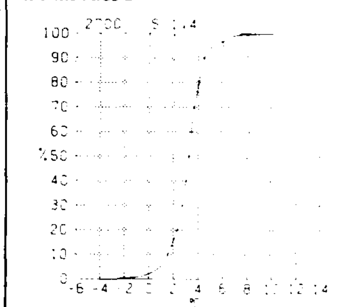
Marine Area B



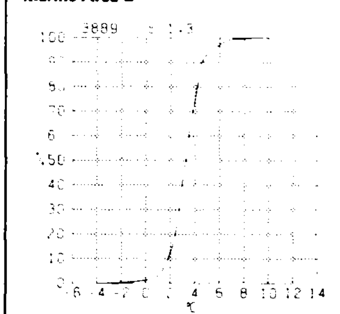
Marine Area C



Marine Area D

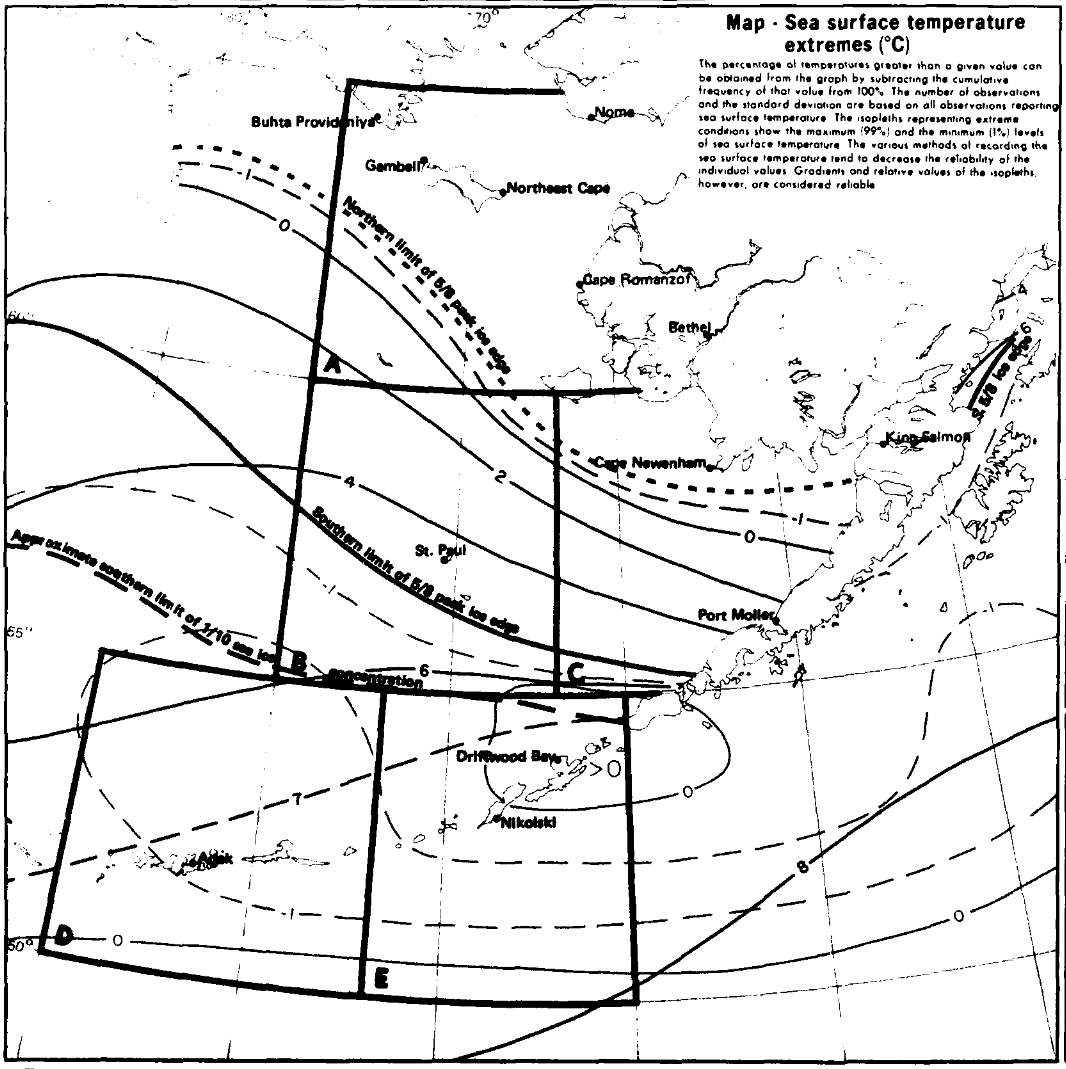


Marine Area E



Map · Sea surface temperature extremes (°C)

The percentage of temperatures greater than a given value can be obtained from the graph by subtracting the cumulative frequency of that value from 100%. The number of observations and the standard deviation are based on all observations reporting sea surface temperature. The isopleths representing extreme conditions show the maximum (99%) and the minimum (1%) levels of sea surface temperature. The various methods of recording the sea surface temperature tend to decrease the reliability of the individual values. Gradients and relative values of the isopleths, however, are considered reliable.



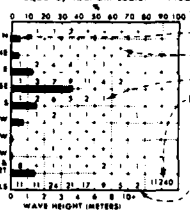
15 Sea surface temperature extremes **February**

Legend

Wave height/direction

Direction frequency (top scale) Bars represent percent frequency of waves from each direction

Height frequency (bottom scale) Printed figures represent percent frequency of wave heights observed from each direction



(5% of all waves were from the N)

indicates < 5% but >0

(1% of all waves were from the S with heights from 6-7.5 meters)

Number of observations

(2% of the waves from all directions had heights ≥10 meters)

WAVE HEIGHT INTERVAL

Feet	0-2	3-6	7-9	10-12	13-19	20-25	26-32	≥33
Meters	0-.5	1-1.5	2-2.5	3-3.5	4-5.5	6-7.5	8-9.5	≥10

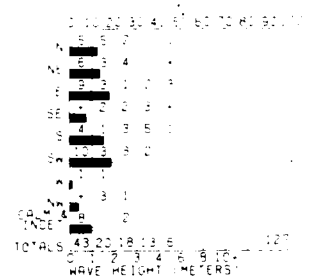
0 1 2 3 4 6 8 10+

Printed scale on bottom of chart

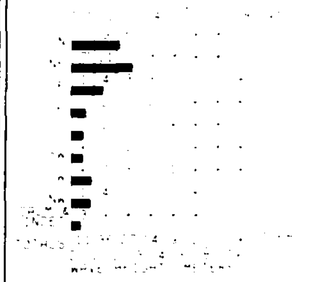
BLACK LINE - Percent frequency of wave height <1.5 meters (<5 feet)

BLUE LINE - Percent frequency of wave height <2.5 meters (<8 feet)

Marine Area A

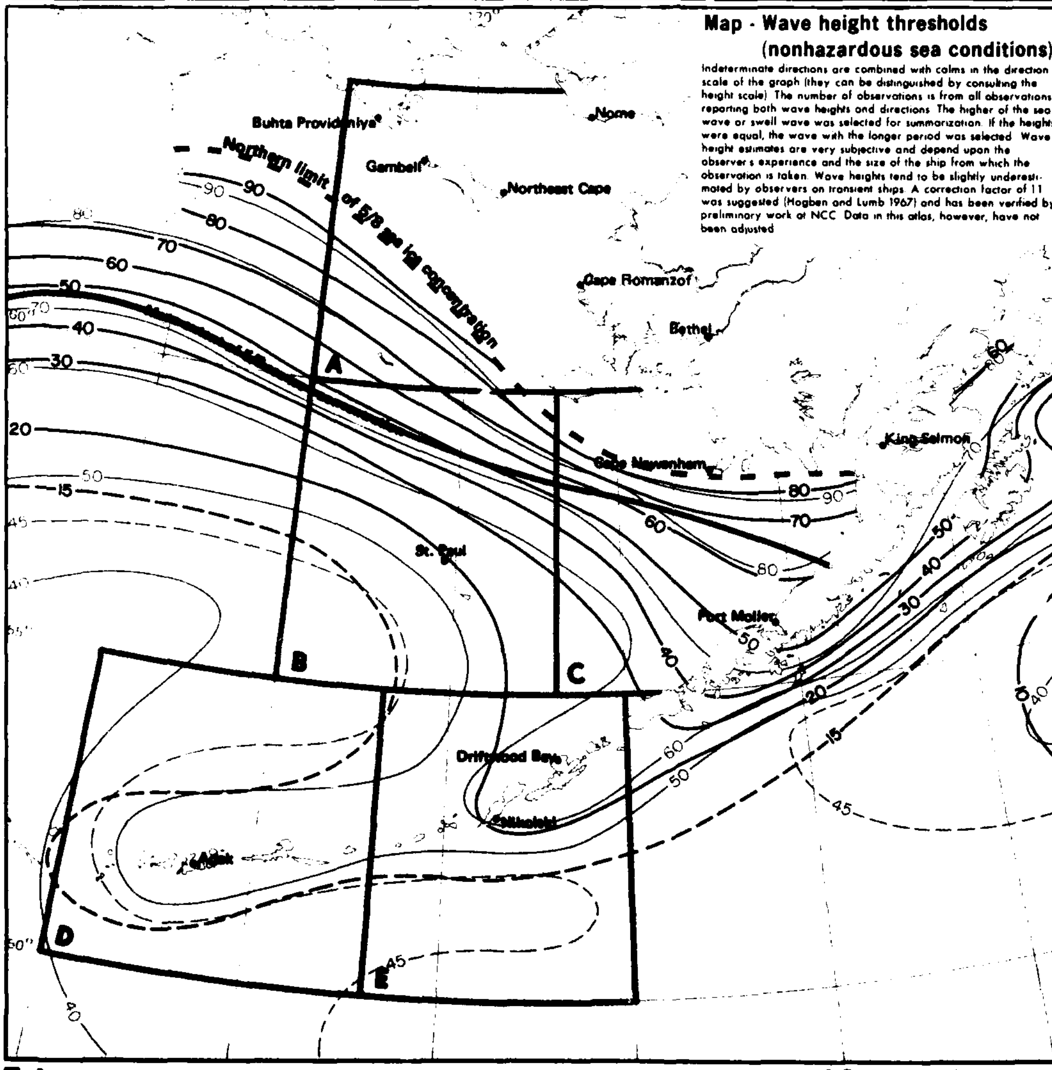


Marine Area B

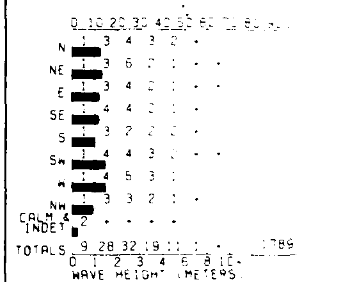


Map - Wave height thresholds (nonhazardous sea conditions)

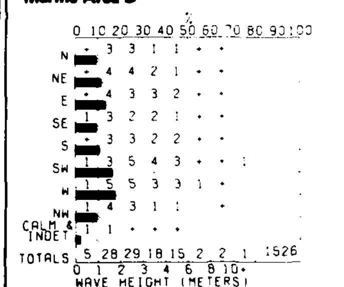
Indeterminate directions are combined with calms in the direction scale of the graph (they can be distinguished by consulting the height scale). The number of observations is from all observations reporting both wave heights and directions. The higher of the sea wave or swell wave was selected for summarization. If the heights were equal, the wave with the longer period was selected. Wave height estimates are very subjective and depend upon the observer's experience and the size of the ship from which the observation is taken. Wave heights tend to be slightly underestimated by observers on transient ships. A correction factor of 1.1 was suggested (Hogben and Lumb 1967) and has been verified by preliminary work at NCC. Data in this atlas, however, have not been adjusted.



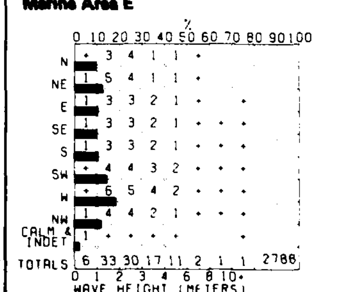
Marine Area C



Marine Area D



Marine Area E



February **16 Wave height thresholds (nonhazardous)**

Legend

Wave height/period

PERIOD (Seconds)

Percent frequency of occurrence of wave period and height

2% of observed waves had a height of 1-1.5 meters and a period of 10-11 seconds

· indicates < 5% but >0

Number of observations

Waves are selected on the basis of the higher of sea and swell when both are reported. If both heights are equal, the wave with the longer period is selected.

BLACK LINE Percent frequency of wave height ≥3.5 meters (≥12 feet)

BLUE LINE Percent frequency of wave height ≥6 meters (≥20 feet)

BLUE NUMBER Maximum observed wave height (meters)

Marine Area A

Marine Area B

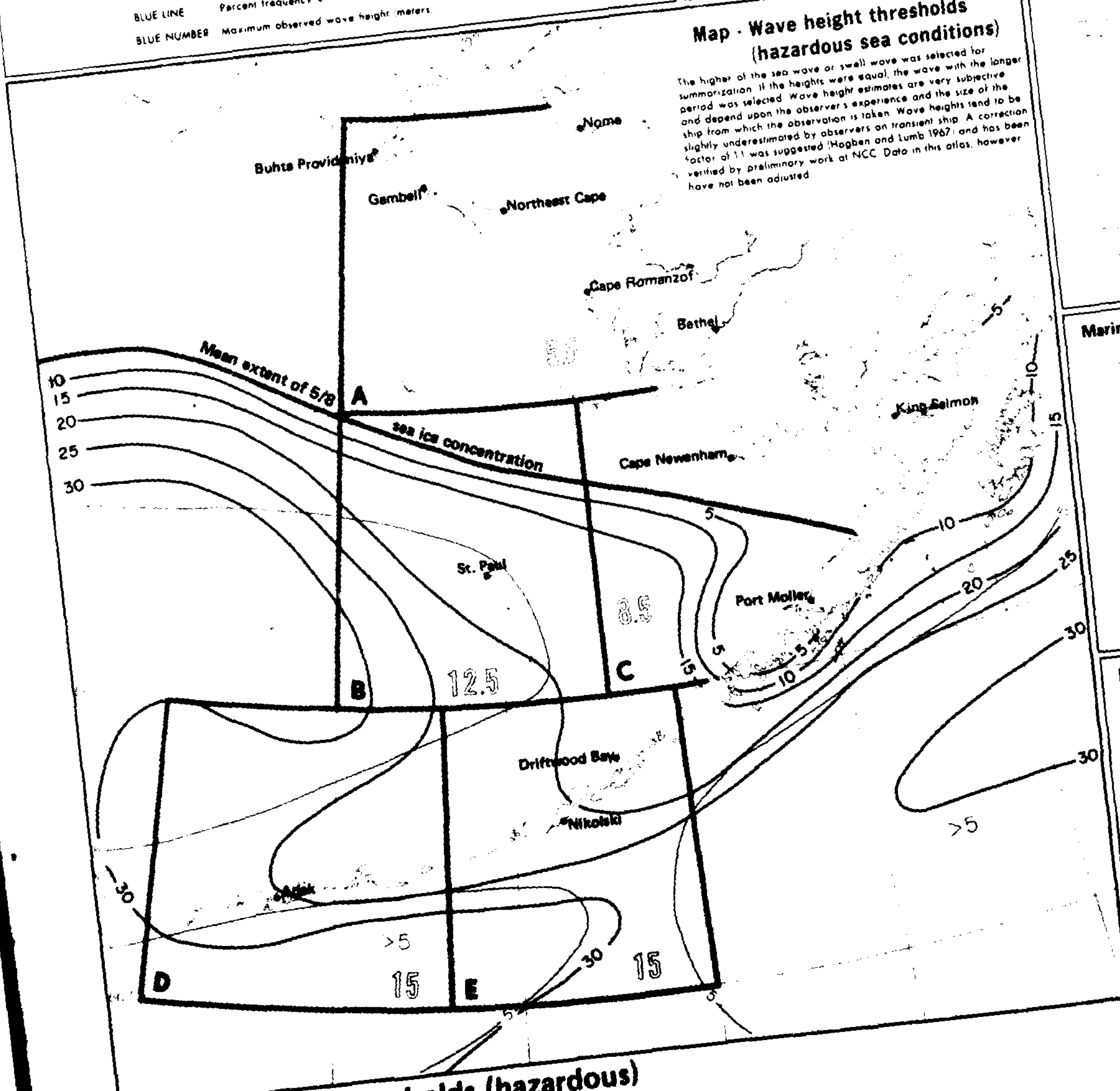
Marine Area C

Marine Area D

Marine Area E

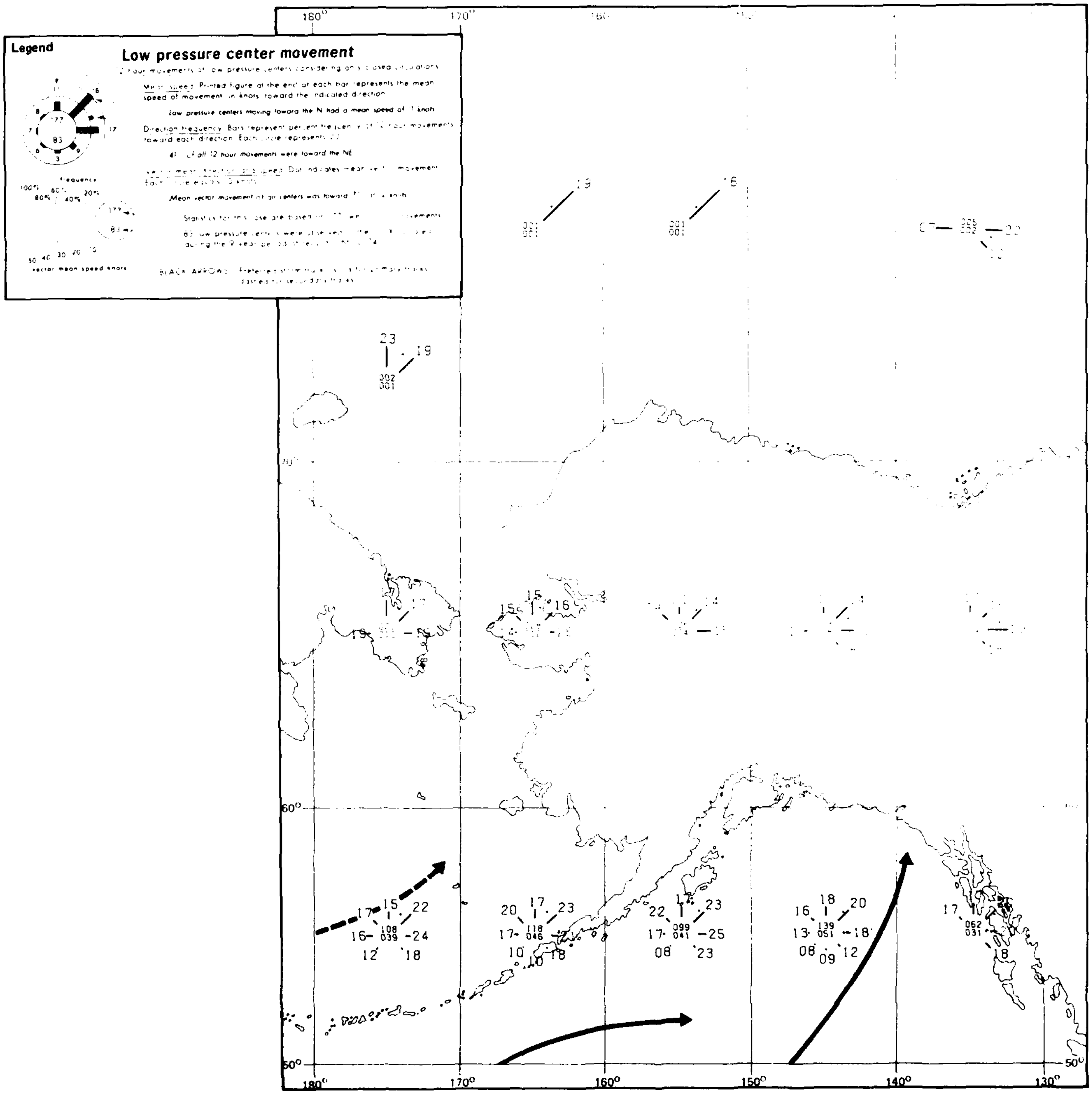
Map · Wave height thresholds (hazardous sea conditions)

The higher of the sea wave or swell wave was selected for summarization. If the heights were equal, the wave with the longer period was selected. Wave height estimates are very subjective and depend upon the observer's experience and the size of the ship from which the observation is taken. Wave heights tend to be slightly underestimated by observers on transient ship. A correction factor of 1.1 was suggested (Hogben and Lumb 1967) and has been verified by preliminary work at NCC. Data in this atlas, however have not been adjusted.



17 Wave height thresholds (hazardous)

February

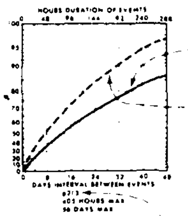


February

18 Low pressure center movement

Legend

Persistence of visibility <2 n. mi.



Hours duration of events Days interval between events

Cumulative percent frequency of hours duration equal to or less than the number of hours intersected by the solid curve

(80% of the events had a duration ≤216 hours)

Cumulative percent frequency of days interval between events equal to or less than the number of days intersected by the broken curve

(88% of the events were followed by another event in 28 days or less)

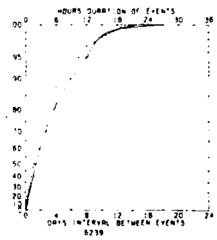
The maximum value(s) of hours duration and/or the days interval will be displayed when the graph limits are exceeded

Durations and intervals for a particular month extend from the time they begin (or the first of the month if already in progress) and are terminated at the actual ending time, regardless of what month that may be

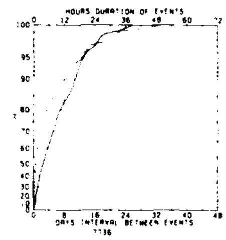
Number of observations

Top and bottom scales are variable to allow for variations in the data

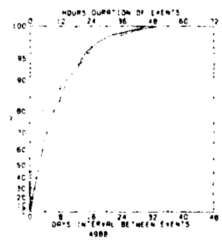
Adak



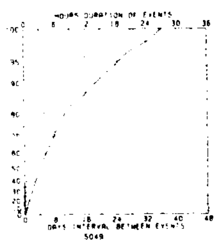
Nome



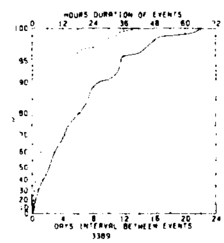
Moses Point



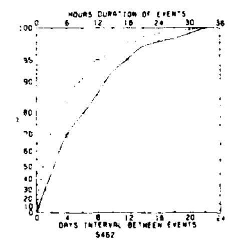
Unalakleet



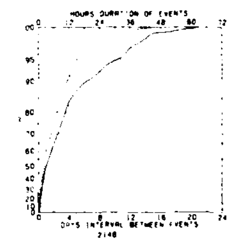
Cape Romanzof



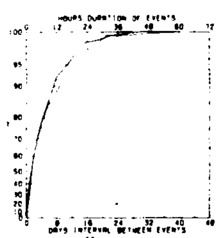
Bethel



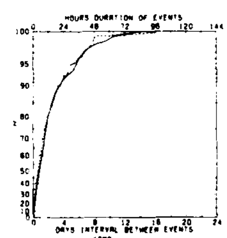
Nikolski



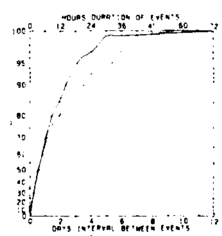
King Salmon



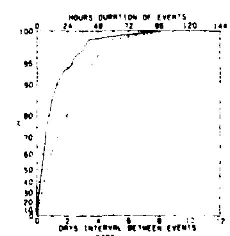
St. Paul



Port Moller



Driftwood Bay

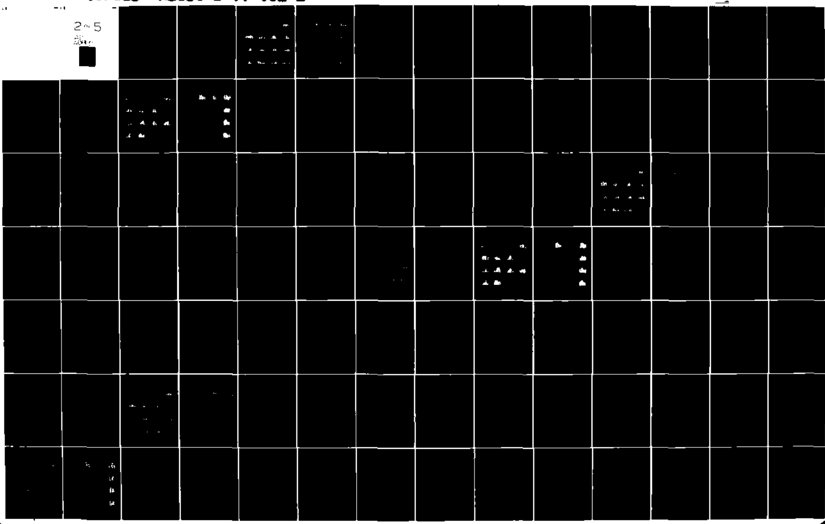


19 Persistence of visibility <2 n. mi.

February

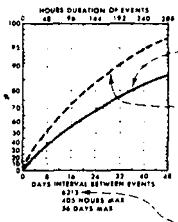
AD-A081 311 ALASKA UNIV ANCHORAGE ARCTIC ENVIRONMENTAL INFORMATI--ETC F/G 4/2
CLIMATIC ATLAS OF THE OUTER CONTINENTAL SHELF WATERS AND COASTA--ETC(U)
1977 W A BROWER, H F DIAZ, A S PRECHTEL
UNCLASSIFIED AEIDC-B-77-VOL-2 NL

2 of 5



Legend

Persistence of wind ≥10 kts.



Hours duration of events · Days interval between events

Cumulative percent frequency of hours duration equal to or less than the number of hours intersected by the solid curve

(80% of the events had a duration ≤216 hours.)

Cumulative percent frequency of days interval between events equal to or less than the number of days intersected by the broken curve

(88% of the events were followed by another event in 28 days or less.)

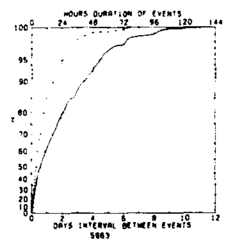
The maximum value(s) of hours duration and · or the days interval will *be displayed when the graph limits are exceeded*

Durations and intervals for a particular month extend from the time they begin (or the first of the month if already in progress) and are terminated at the actual ending time, regardless of what month that may be.

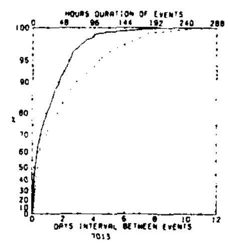
Number of observations

Top and bottom scales are variable to allow for variations in the data

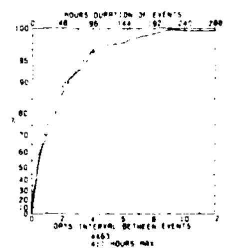
Adak



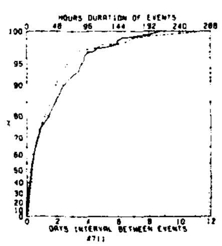
Nome



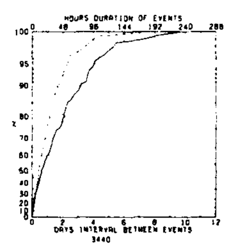
Moses Point



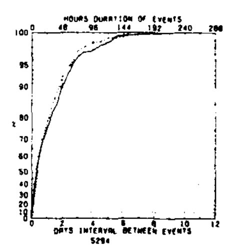
Unalakleet



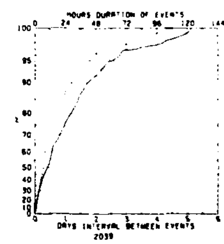
Cape Romanzof



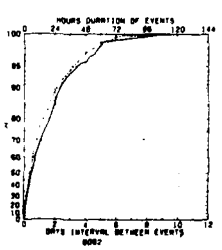
Bethel



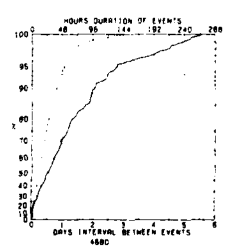
Nikolski



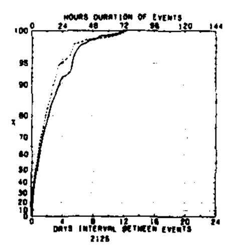
King Salmon



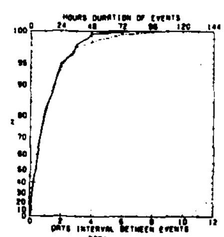
St. Paul



Port Moller

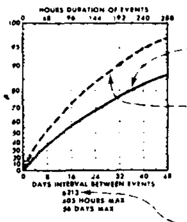


Driftwood Bay



Legend

Persistence of wind ≥20 kts.



Hours duration of events · Days interval between events

Cumulative percent frequency of hours duration equal to or less than the number of hours intersected by the solid curve

(80% of the events had a duration ≤216 hours.)

Cumulative percent frequency of days interval between events equal to or less than the number of days intersected by the broken curve

(88% of the events were followed by another event in 28 days or less.)

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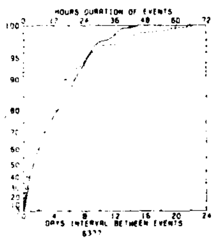
Durations and intervals for a particular month extend from the time they begin (or the first of the month if already in progress) and are terminated at the actual ending time, regardless of what month that may be

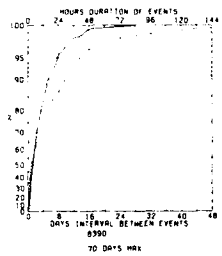
Number of observations

Top and bottom scales are variable to allow for variations in the data

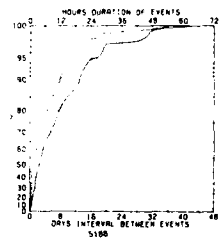
Adak



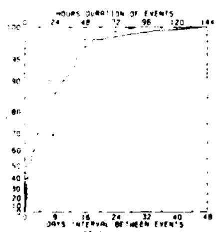
Nome



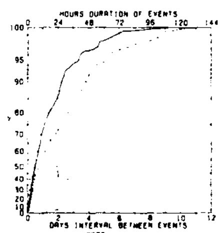
Moses Point



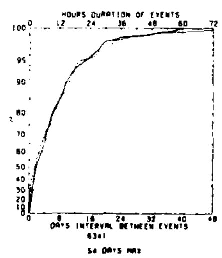
Unalakleet



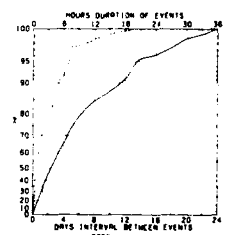
Cape Romanzof



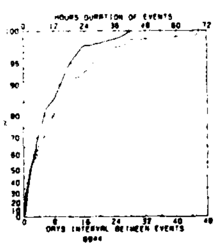
Bethel



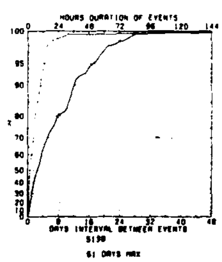
Nikolski



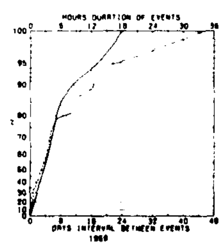
King Salmon



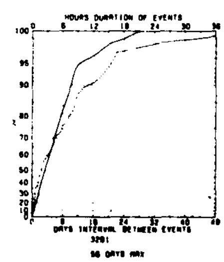
St. Paul



Port Moller



Driftwood Bay

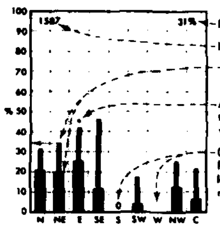


21 Persistence of wind ≥20 kts. **February**

Legend

Precipitation/wind direction

Percent frequency of surface wind observations from each direction and calm that were accompanied by precipitation, subdivided into liquid type (including freezing rain and freezing drizzle) and snow



—Percentage of present weather observations reporting precipitation

—Number of observations

—(34% of all NE winds were accompanied by precipitation, of which 14% was liquid and 20% was snow)

—An asterisk in the column for a given direction (or calm) indicates that the percentage was based on 10-30 observations of present weather and wind direction

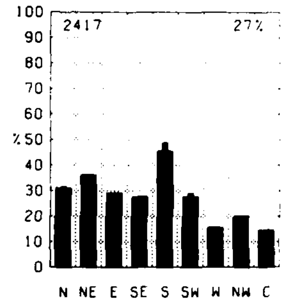
—0 replaces bar when no precipitation was observed with winds from a given direction (or calm). No bar graph is presented if less than 10 observations containing present weather were reported for a given direction (or calm)

Map - Precipitation

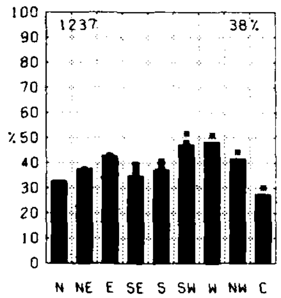
BLACK LINE: Percent frequency of observations reporting precipitation

Of all the elements recorded in historical marine observations, precipitation is one of those most subject to interpretation error, from coding practices, observers preference for certain present weather codes, and other biases

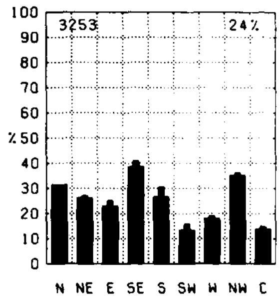
Buhta Providenija



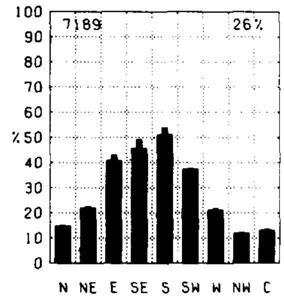
Gambell



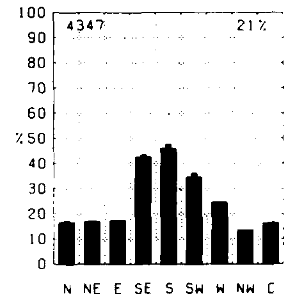
Northeast Cape



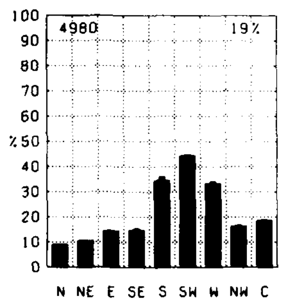
Nome



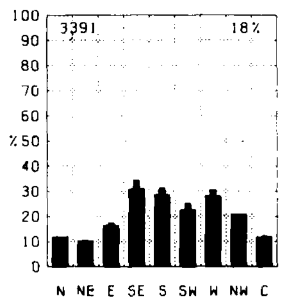
Moses Point



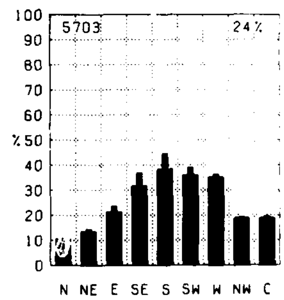
Unalakleet



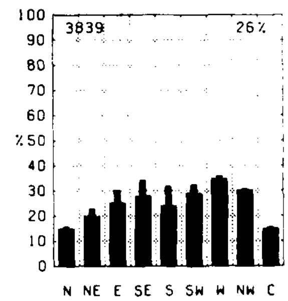
Cape Romanzof



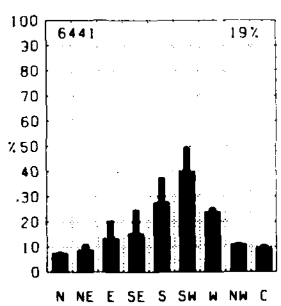
Bethel



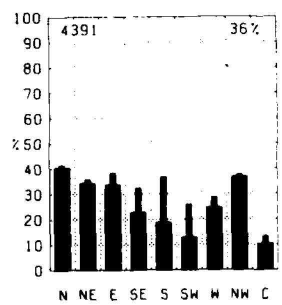
Cape Newenham



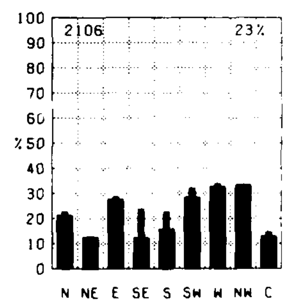
King Salmon



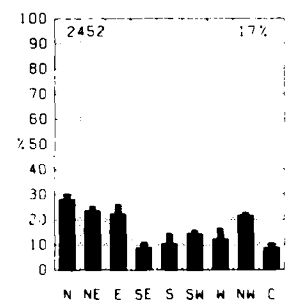
St. Paul

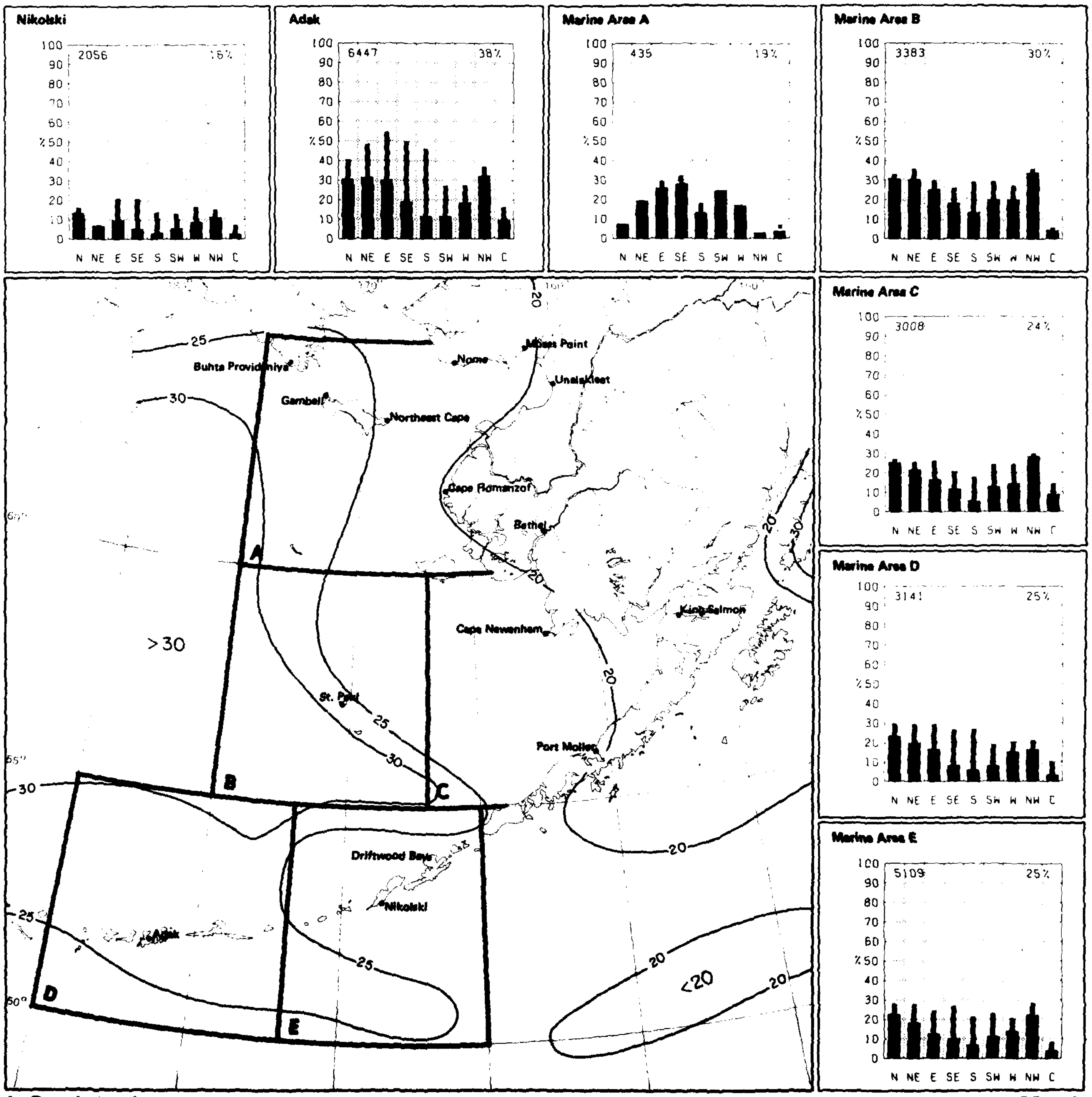


Port Moller



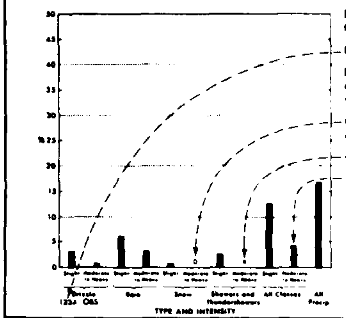
Driftwood Bay





1 Precipitation **March**

Legend — **Precipitation types**



Percent frequency of precipitation by type and intensity

Number of observations

Bars show percent frequency of observations reporting Precipitation of various types and intensities

0 indicates no observations in the category

• indicates < 05% but > 0

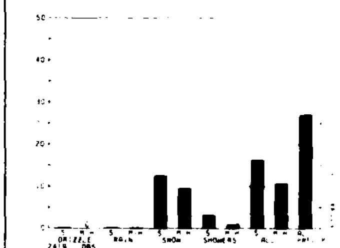
(4.0% of all observations recorded moderate to heavy precipitation)

Map - Snow

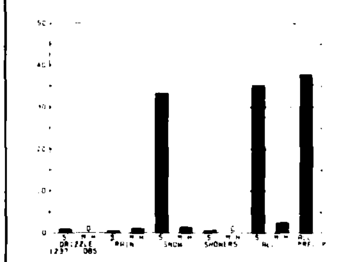
BLACK LINE Percent frequency of precipitation observations reporting snow

The percent frequency of observations reporting snow for a given point can be determined by multiplying the percent frequency of observations reporting precipitation (map 1) with that of precipitation observations reporting snow (map 2)

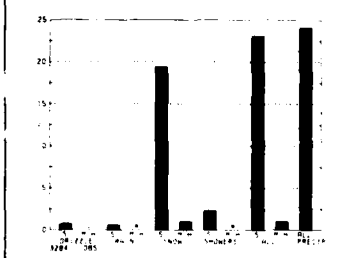
Buhta Provideniya



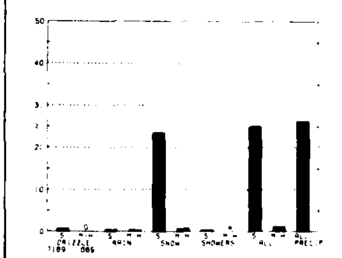
Gambell



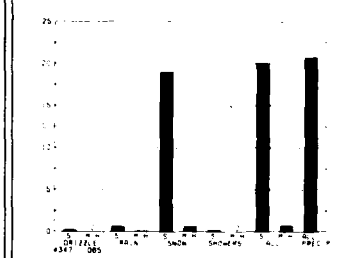
Northeast Cape



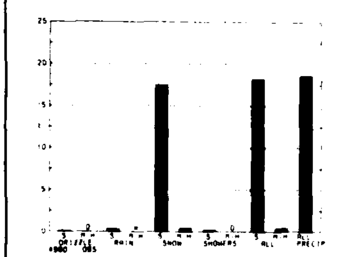
Nome



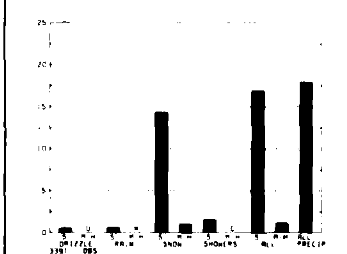
Moses Point



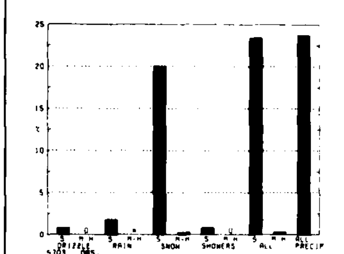
Unalakleet



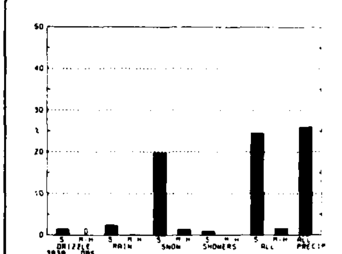
Cape Romanzof



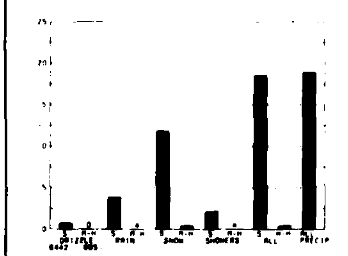
Bethel



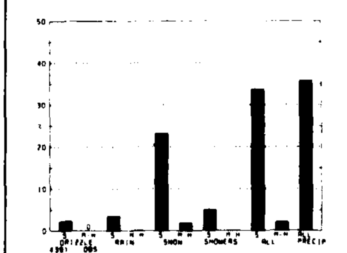
Cape Newenham



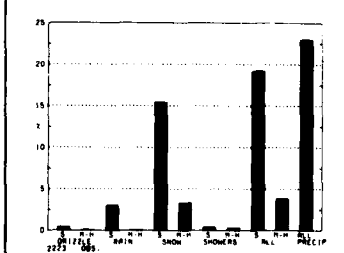
King Salmon



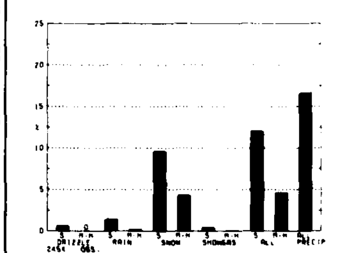
St. Paul

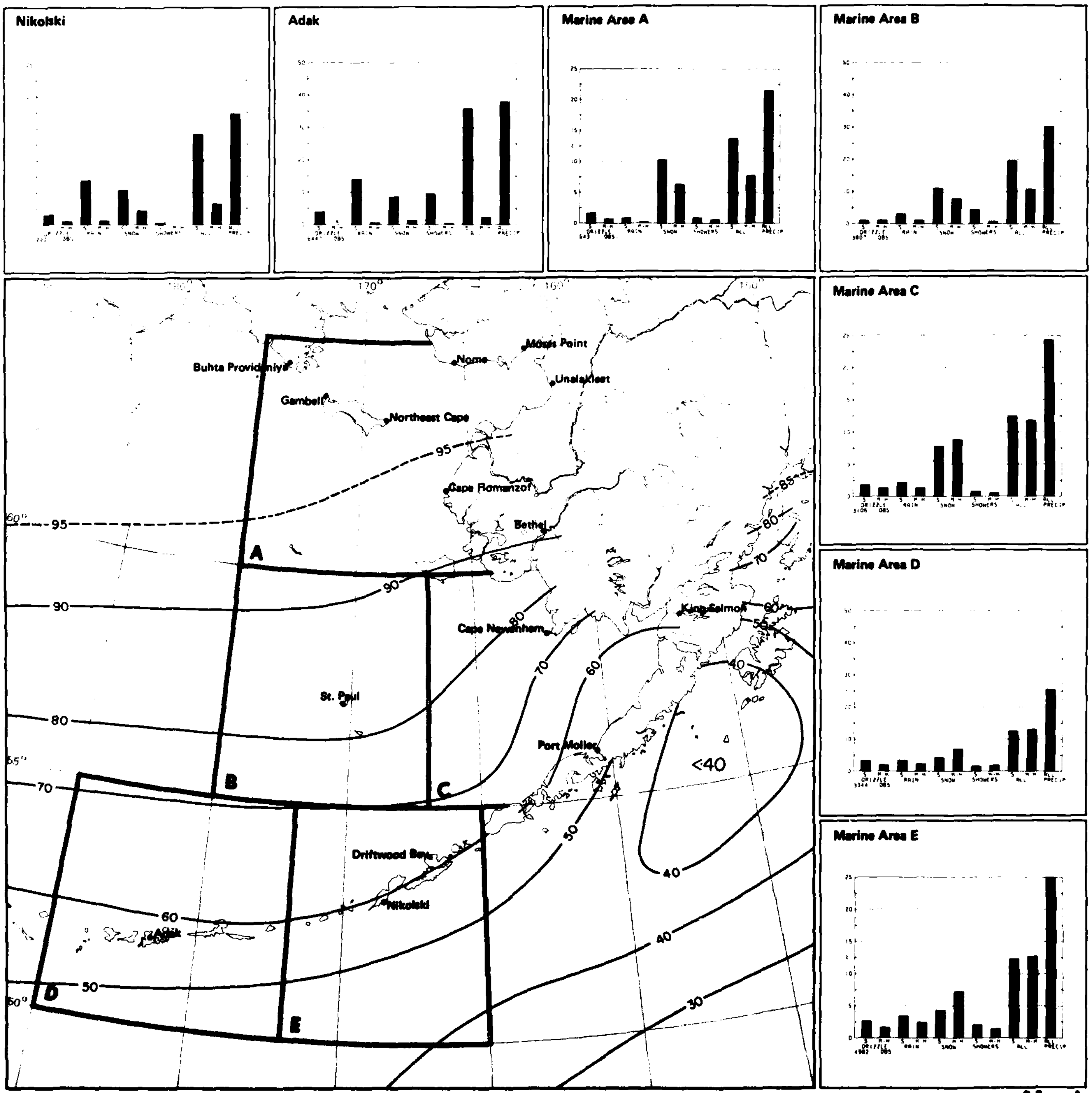


Port Moller



Driftwood Bay




Nikolski
Adak
Marine Area A
Marine Area B
Marine Area C
Marine Area D
Marine Area E
Buhta Providenniya
Gambell
Nome
Moses Point
Unalakleet
Northeast Cape
Cape Romanzof
Bethel
Cape Newenham
King Salmon
St. Paul
Port Moller
Driftwood Bay
Nikolski
Adak
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B
C
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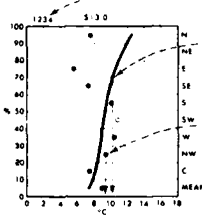
2 Snow

March

Legend

Air temperature/wind direction



Number of observations

Cumulative percent frequency of temperatures equal to or less than the temperature intersected by the curve

(70% of all temperatures were ≤10.3 °C or ≤50.5 °F)

S Standard deviation of temperatures (°C)

Mean temperature for each wind direction, calm and for all data combined are represented by dots

(With NW winds, the mean temperature was 9.4 °C or 48.9 °F)

Indicates that the mean temperature for a direction or calm was computed from 10-30 observations

The mean temperature is omitted when less than 10 observations for a direction or calm were available

Map - Air temperature mean and thresholds

BLACK LINE Percent frequency of temperature ≤0°C (≤32°F)

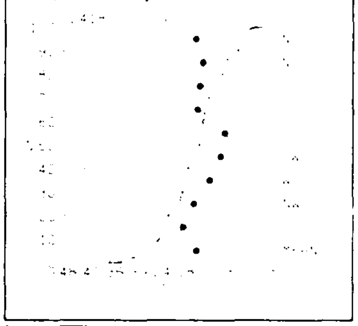
RED LINE Mean air temperature °C

BLUE LINE Percent frequency of wind chill temperature ≤ 30°C (≤ 22°F)

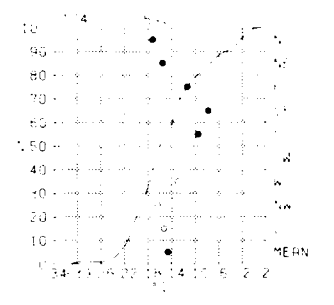
Air temperature readings recorded on transient ships in warm, sunny weather appear biased toward high temperatures, apparently because of improper instrument exposure and ventilation. Despite the inaccuracies, the large-scale patterns and mean gradients of the isopleth analyses are relatively accurate.

The temperature scale of the graph may vary in both range and class interval. The percentage of temperature observations greater than a given value can be obtained by subtracting the cumulative percent frequency of that value from 100%. The number of observations and the standard deviation plus the plotted points on the graphs are based on those observations reporting both temperature and wind direction. The cumulative curve is based on all observations reporting temperature with or without wind direction.

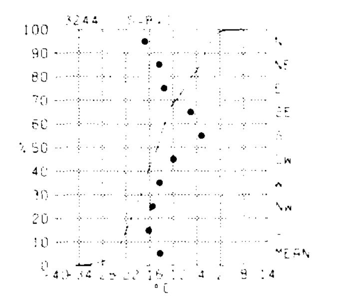
Buhta Provideniya



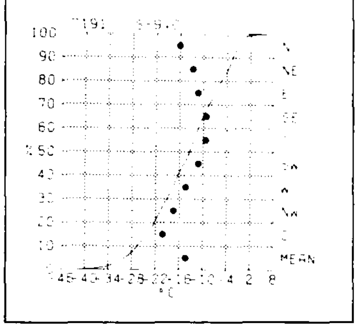
Gambell



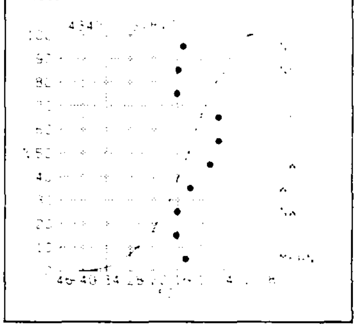
Northeast Cape



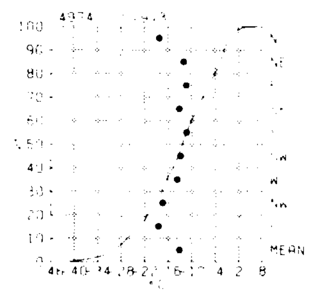
Nome



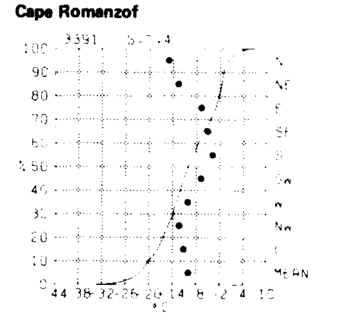
Moses Point



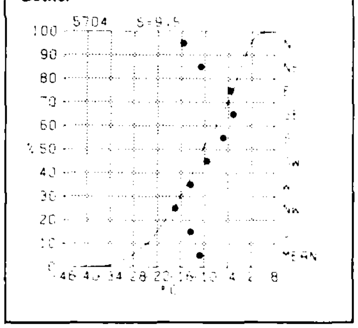
Unalakleet



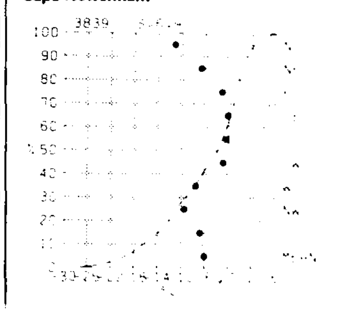
Cape Romanzof



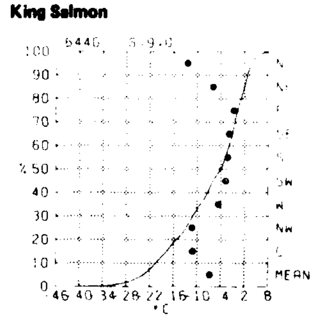
Bethel



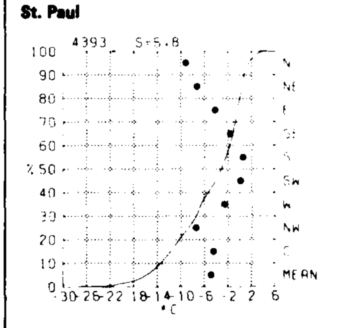
Cape Newenham



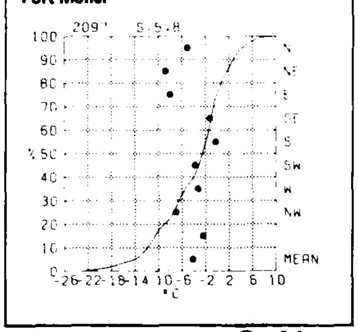
King Salmon



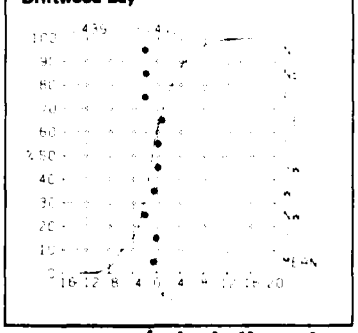
St. Paul

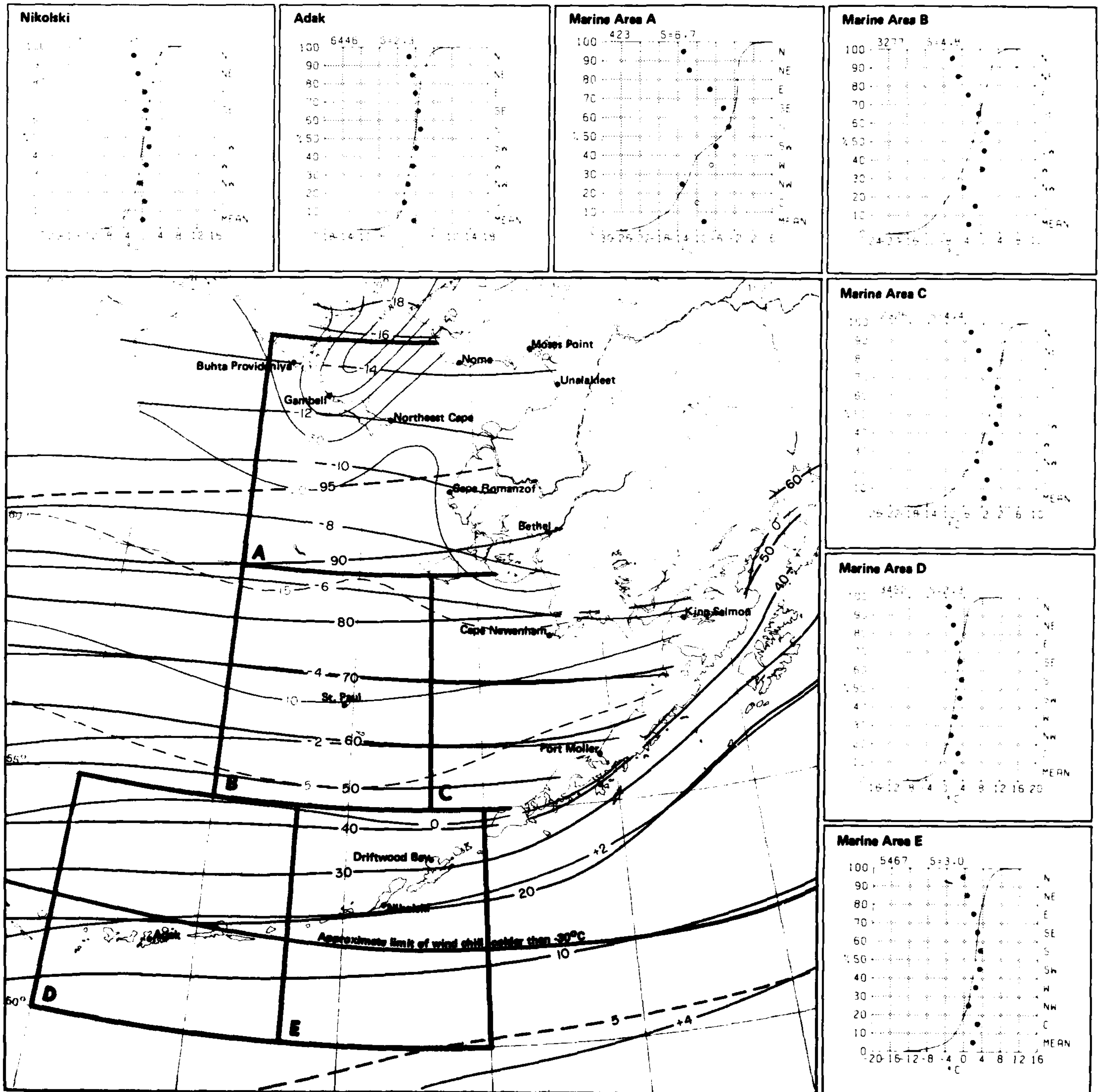


Port Moller



Driftwood Bay

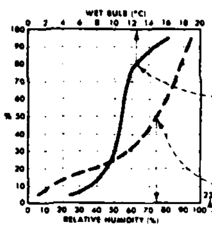




3 Air temperature mean and thresholds **March**

Legend

Wet bulb/relative humidity



Cumulative percent frequency of wet bulb temperatures equal to or less than the temperature intersected by the curve (top scale)

Wet bulb (°C)

(80% of all observed wet-bulb temperatures were ≤12.5°C or 54.5°F)

Cumulative percent frequency of relative humidities equal to or less than the humidity intersected by the curve (bottom scale)

Relative humidity (%)

(50% of all observed relative humidities were ≤74%)

Number of observations

Map - Mean dew point temperature

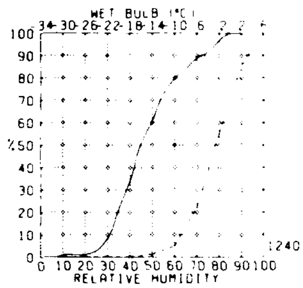
BLACK LINE Mean dew point temperature (°C)

The observation count of the graph reflects those observations reporting both air and wet bulb temperatures, both are required in computing the relative humidity. The percentage of observations of either element greater than a given value can be obtained by subtracting the cumulative percent frequency of that value from 100%.

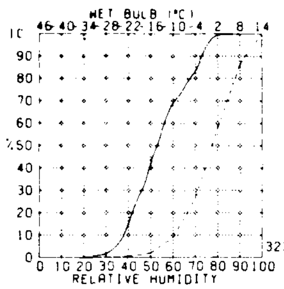
Buhta Provideniya

Insufficient Data

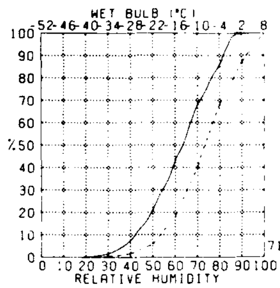
Gambell



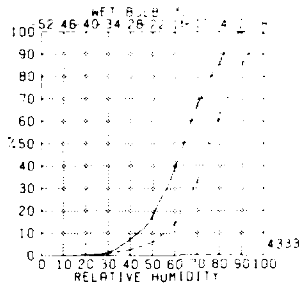
Northeast Cape



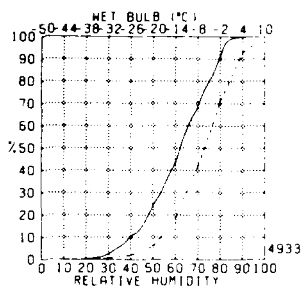
Nome



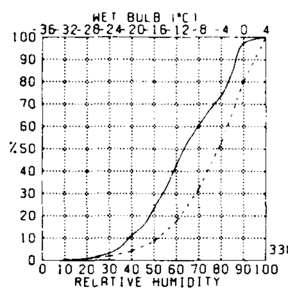
Moses Point



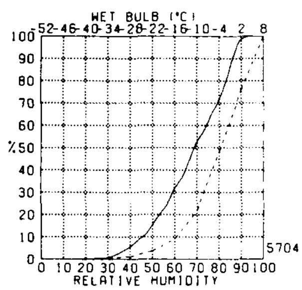
Unalakleet



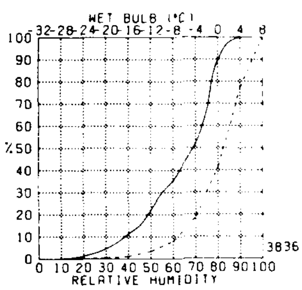
Cape Romanzof



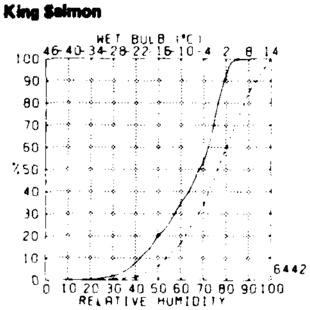
Bethel



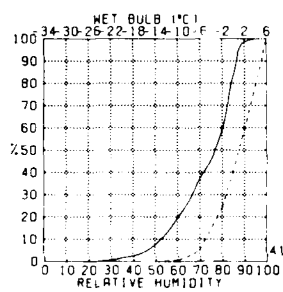
Cape Newenham



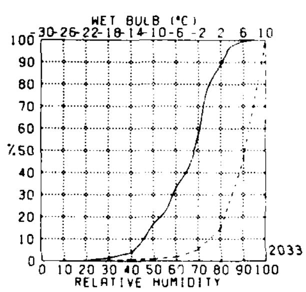
King Salmon



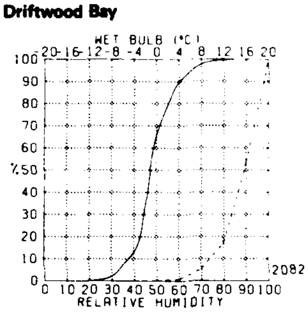
St. Paul

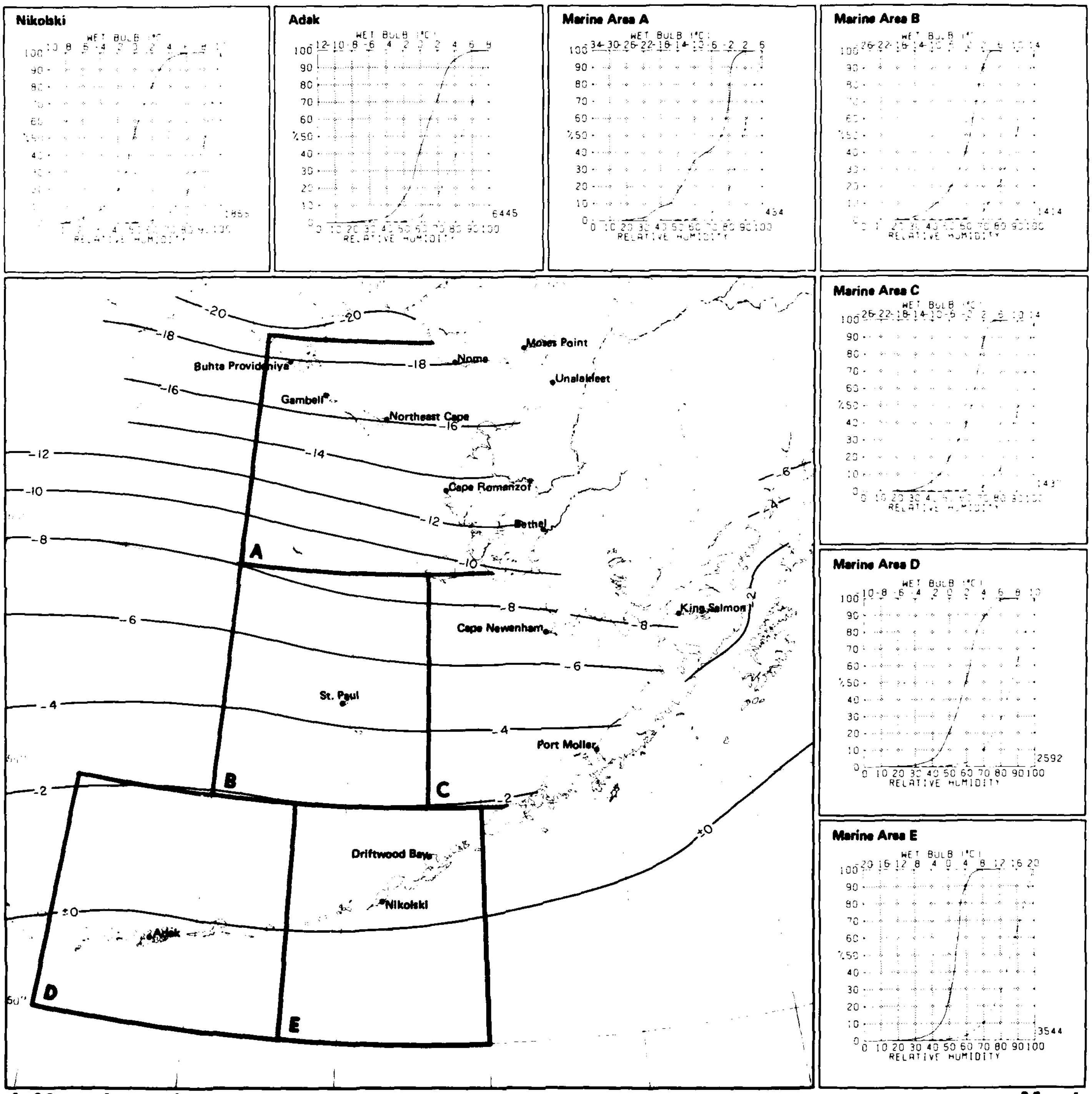


Port Moller



Driftwood Bay





4 Mean dew point temperature

March

Legend

Air temperature/wind speed

WIND SPEED (kts)

TEMP (°C)	0-3	4-10	11-21	22-33	≥34
4.5	18	8	7	1	1
2.3	17	8	7	1	1
0.1	13	6	5	1	1
-2.-1	1	+	0	0	0
-4.-3	0	0	0	0	0
-6.-5	+	0	0	+	+
-8.-7	1	+	0	0	0
-10.-9	0	0	0	0	0
-12.-11	1	+	0	0	0
-14.-13	1	0	0	0	0
-16.-15	1	+	0	0	0
					3550

Percent frequency of simultaneous occurrence of specified temperature (°C) and wind speed (knots)

(1% of all observations reported temperature 2-3°C simultaneously with wind speed of 22-33 kts.)

Indicates < 5% but >0

Number of observations

Map - Air temperature extremes (°C)

BLACK LINE Maximum (99%) air temperature (1% of temperatures were greater than the given value

BLUE LINE Minimum (1%) air temperature (1% of temperatures were equal to or less than the given value)

The graph can be used to determine the extent of human discomfort from the combined effects of extreme heat or cold and winds or to estimate the likelihood of superstructure icing. Icing potential increases as the air temperature drops below freezing and the winds increase above 10 knots (12 mph) and may become quite severe with temperatures equal to or less than 9°C (16°F) and winds equal to or greater than 34 knots (39 mph)

Buhta Providenya

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥34
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
					[illegible]

Gambell

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥34
0.1	0	0	+	[illegible]	+
-2.-1	0	+	[illegible]	[illegible]	[illegible]
-4.-3	+	+	[illegible]	[illegible]	[illegible]
-6.-5	+	+	[illegible]	[illegible]	[illegible]
-8.-7	+	[illegible]	[illegible]	[illegible]	+
-10.-9	+	[illegible]	[illegible]	[illegible]	+
-12.-11	+	[illegible]	[illegible]	[illegible]	[illegible]
-14.-13	[illegible]	+	[illegible]	4	+
-16.-15	[illegible]	[illegible]	[illegible]	4	+
-18.-17	[illegible]	4	[illegible]	[illegible]	[illegible]
≤-19	[illegible]	[illegible]	[illegible]	[illegible]	+
					[illegible]

Northeast Cape

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥34
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
					[illegible]44

Nome

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥34
4.5	+	+	+	[illegible]	[illegible]
2.3	+	+	+	+	0
0.1	+	1	1	+	+
-2.-1	+	2	3	1	0
-4.-3	1	2	4	1	+
-6.-5	1	2	3	1	+
-8.-7	1	3	2	1	+
-10.-9	1	2	2	+	+
-12.-11	2	4	3	1	+
-14.-13	2	3	2	1	+
≤-15	21	16	7	1	+
					7186

Moses Point

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥34
6.7	0	+	+	[illegible]	[illegible]
4.5	0	+	+	[illegible]	[illegible]
2.3	+	+	+	[illegible]	[illegible]
0.1	+	1	1	+	+
-2.-1	[illegible]	[illegible]	[illegible]	+	+
-4.-3	[illegible]	[illegible]	[illegible]	+	+
-6.-5	+	[illegible]	[illegible]	+	+
-8.-7	[illegible]	[illegible]	4	[illegible]	[illegible]
-10.-9	[illegible]	[illegible]	4	[illegible]	[illegible]
-12.-11	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
≤-13	7	22	14	[illegible]	+
					4[illegible]45

Unalakleet

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥34
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
≤-11	1[illegible]	25	16	5	+
					4963

Cape Romanzof

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥34
6.7	+	+	[illegible]	0	0
4.5	+	+	+	0	0
2.3	+	1	1	+	+
0.1	1	1	2	1	+
-2.-1	1	3	[illegible]	2	+
-4.-3	1	2	4	1	+
-6.-5	1	2	2	1	0
-8.-7	2	2	3	1	0
-10.-9	2	2	2	1	+
-12.-11	3	2	3	2	+
≤-13	8	7	14	6	2
					3391

Bethel

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥34
8.9	0	+	0	0	0
6.7	+	+	+	0	0
4.5	+	1	+	+	0
2.3	+	1	2	+	+
0.1	+	3	4	1	+
-2.-1	1	4	4	1	+
-4.-3	+	4	3	+	+
-6.-5	+	3	2	+	0
-8.-7	1	4	3	+	0
-10.-9	+	3	2	+	+
≤-11	4	24	19	2	+
					5704

Cape Newenham

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥34
6.7	0	+	+	+	[illegible]
4.5	+	+	1	+	+
2.3	1	2	4	1	+
0.1	2	4	5	2	+
-2.-1	3	5	7	2	+
-4.-3	4	5	3	1	+
-6.-5	2	4	2	+	+
-8.-7	2	3	2	+	+
-10.-9	1	7	2	+	+
-12.-11	2	3	3	+	+
≤-13	4	5	7	1	+
					3839

King Salmon

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥34
12.13	0	0	+	+	0
10.11	0	+	+	0	0
8.9	+	+	+	+	0
6.7	+	+	1	+	+
4.5	+	1	2	1	+
2.3	1	4	5	2	+
0.1	1	5	4	1	+
-2.-1	2	7	4	+	+
-4.-3	2	4	2	+	+
-6.-5	1	3	1	+	0
≤-7	9	21	13	1	+
					6440

St. Paul

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥34
4.5	0	+	+	+	0
2.3	+	2	4	3	+
0.1	+	5	10	3	+
-2.-1	+	5	8	4	+
-4.-3	+	3	5	2	+
-6.-5	+	2	3	1	1
-8.-7	+	2	5	2	+
-10.-9	+	1	3	2	+
-12.-11	+	1	3	2	+
-14.-13	+	1	2	2	+
≤-15	+	2	3	2	+
					4393

Port Moller

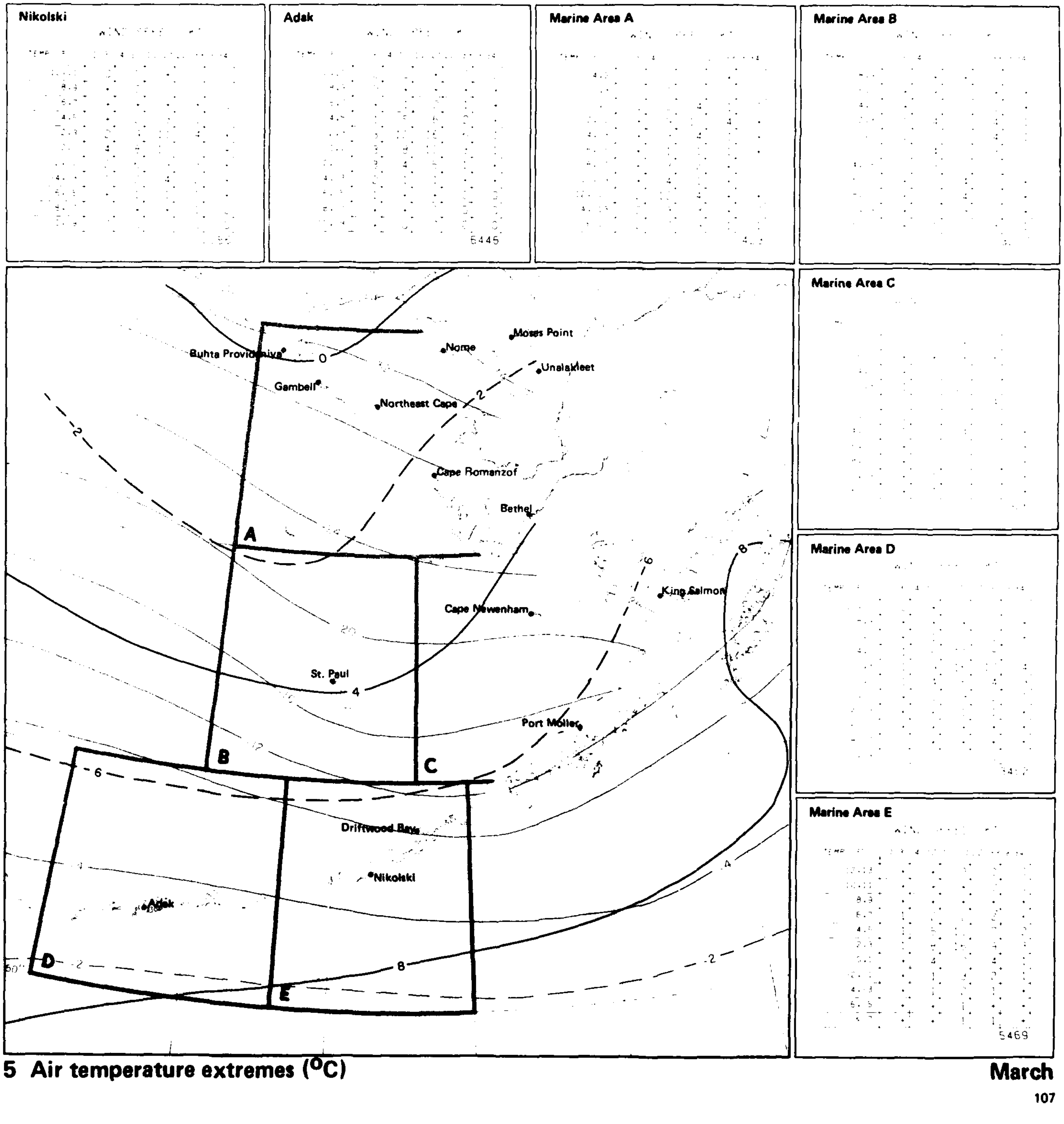
WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥34
10.11	+	+	0	0	0
8.9	+	+	+	0	0
6.7	1	1	1	+	0
4.5	1	1	1	+	+
2.3	1	3	3	1	+
0.1	3	7	5	1	0
-2.-1	5	7	5	+	0
-4.-3	4	7	3	0	0
-6.-5	2	4	2	+	0
-8.-7	1	6	3	+	0
≤-9	2	11	8	+	0
					2097

Driftwood Bay

WIND SPEED (KTS)

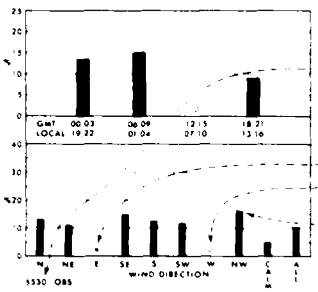
TEMP (°C)	0-3	4-10	11-21	22-33	≥34
14.15	+	+	0	0	0
12.13	0	+	+	+	0
10.11	0	+	1	+	0
8.9	1	1	1	+	0
6.7	1	1	0	+	0
4.5	1	2	1	+	0
2.3	4	6	3	+	0
0.1	5	9	6	+	0
-2.-1	6	13	7	+	+
-4.-3	3	7	4	+	0
≤-5	2	7	4	+	0
					2439



5 Air temperature extremes (°C)

March

Legend **Fog/time and fog/wind direction**



Number of observations

Bar graphs represent percent frequency of Fog (without precipitation) for various hour groupings and wind directions. Data are based on 100% for each hour group and direction category

• indicates < 0.5% but > 0

0 indicates no fog occurred with the wind direction

(Data show that 17% of all NW winds were accompanied by Fog (without precipitation).)

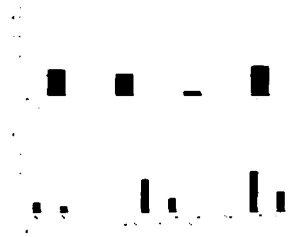
Map - Fog

BLACK LINE Percent frequency of occurrence of all fog

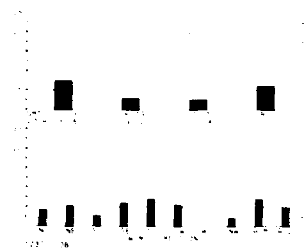
BLUE LINE Percent frequency of fog occurring without precipitation

The percent frequency of observations reporting fog with precipitation for a given point can be determined by computing the difference between the two analyses

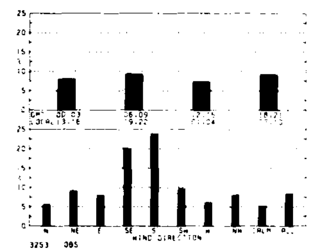
Buhta Provideniya



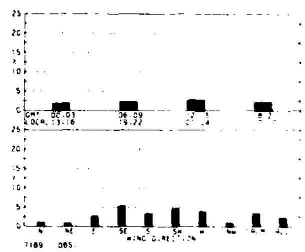
Gambell



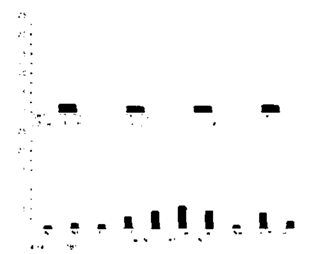
Northeast Cape



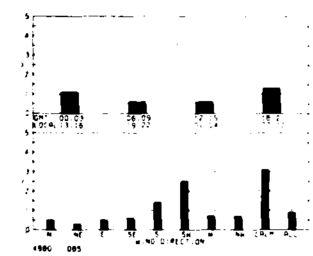
Nome



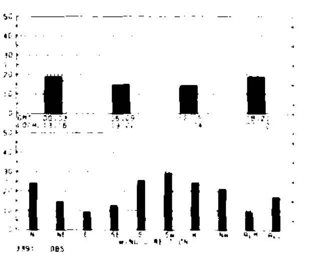
Moses Point



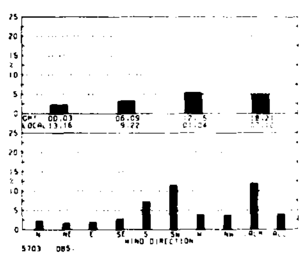
Unalakleet



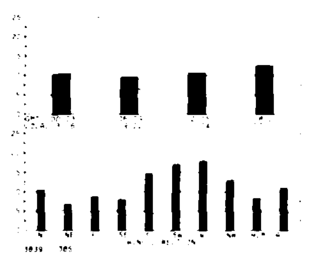
Cape Romanzof



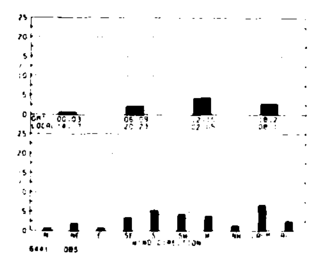
Bethel



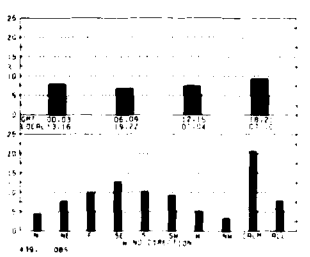
Cape Newenham



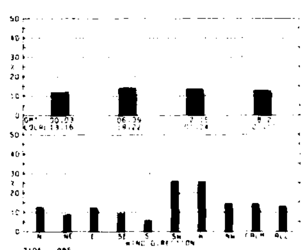
King Salmon



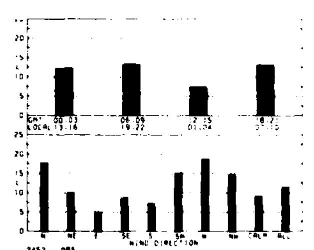
St. Paul



Port Moller



Driftwood Bay



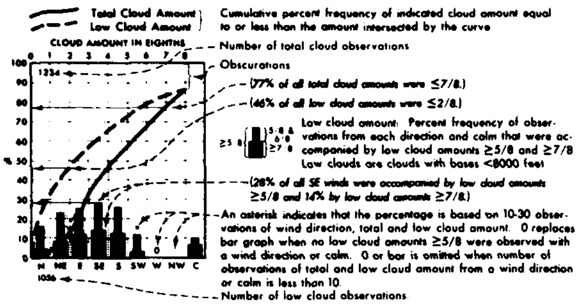

Nikolski
Adak
Marine Area A
Marine Area B
Marine Area C
Marine Area D
Marine Area E
Buhta Providéniya
Gambell
Nome
Moses Point
Unalakleet
Northeast Cape
Cape Romanzof
Bethel
Cape Newenham
King Salmon
St. Paul
Port Moller
Driftwood Bay
Nikolski
Adak
A
B
C
D
E
>10
>10
5
10
15
20

6 Fog

March

Legend

Cloud cover/wind direction



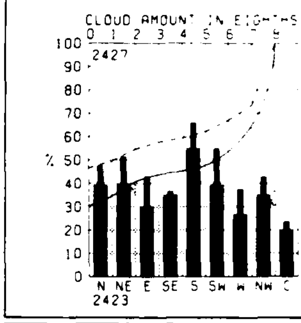
Map · Cloud amount thresholds

BLACK LINE · Percent frequency of total cloud amount ≤2/8

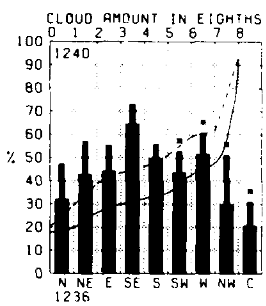
BLUE LINE · Percent frequency of low cloud amount ≥5/8

Since the number of observations reporting low cloud amount is usually less than that for total cloud amount, somewhat different samples may be used to compute the two curves on the graph. This may lead to inconsistencies where low cloud amount appears higher than the total cloud amount. Where this occurred the graph was adjusted in favor of the total cloud by making the curves coincide. The frequency of obscured conditions may be determined by subtracting the cumulative percent frequency corresponding to 8/8 coverage from 100%. In computing the bar graph, obscurations are considered as 8/8 coverage.

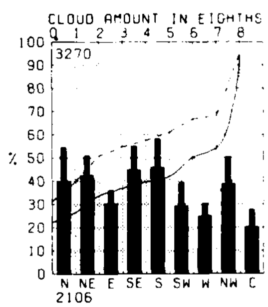
Buhta Provideniya



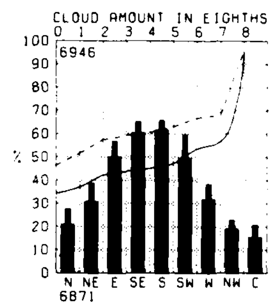
Gambell



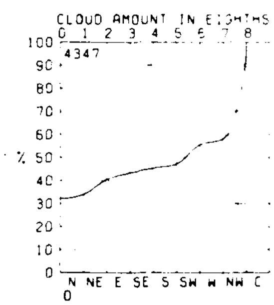
Northeast Cape



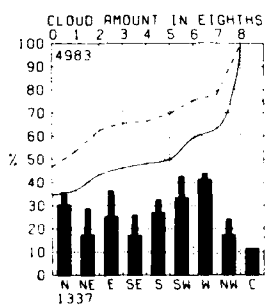
Nome



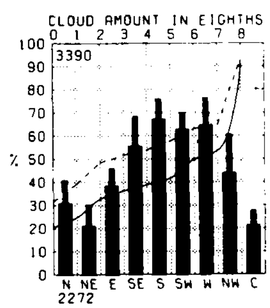
Moses Point



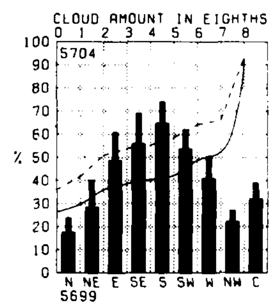
Unalakleet



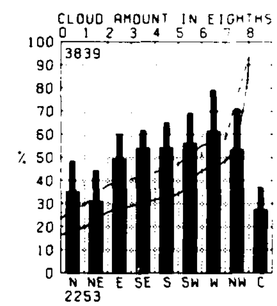
Cape Romanzof



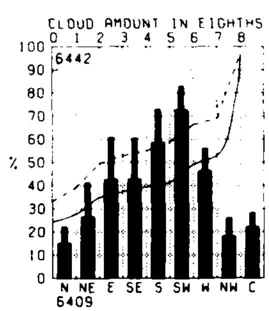
Bethel



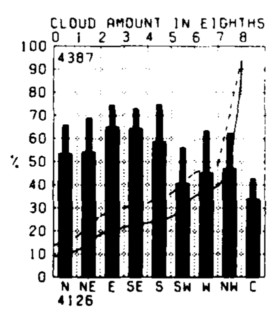
Cape Newenham



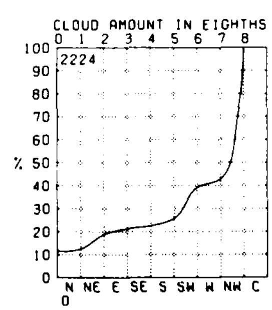
King Salmon



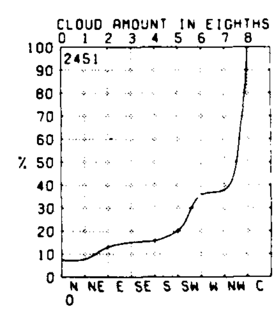
St. Paul

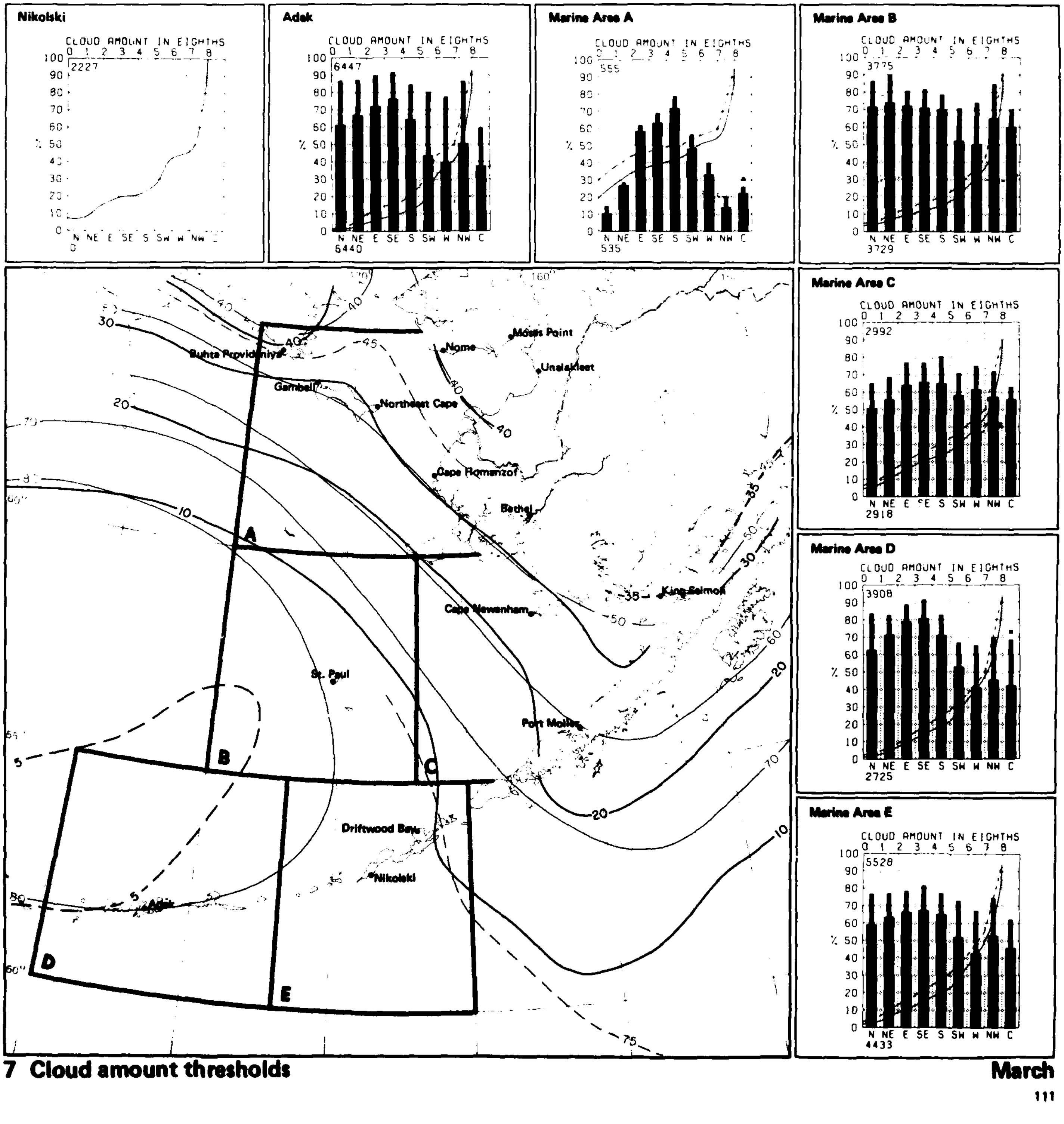


Port Moller



Driftwood Bay



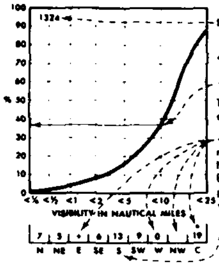


7 Cloud amount thresholds

March

Legend

Visibility/wind direction



Number of observations

Cumulative percent frequency of visibilities less than the visibility intersected by the curve

(37% of all visibilities reported were <10 nautical miles.)

The table below the graph indicates percent frequency of occurrence of visibility <2 nautical miles versus wind direction

+ indicates < 5% but >0   0 indicates that no visibilities <2 nautical miles were observed with winds from a direction or calm. No percentage is given if less than 10 observations were available for visibility and wind direction. An asterisk indicates that the percentage was based on 10-30 observations of visibility and wind direction

(13% of all S winds were accompanied by visibilities <2 nautical miles.)

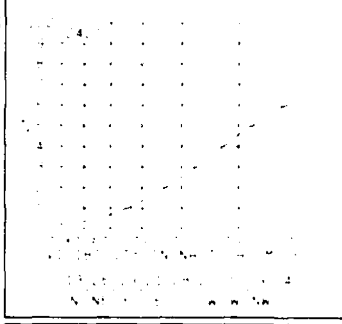
Map - Visibility thresholds

BLACK LINE   Percent frequency of visibilities ≥5 nautical miles

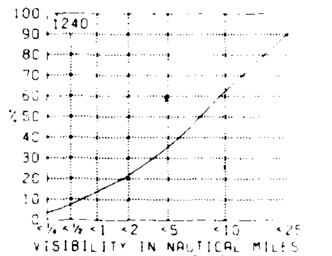
BLUE LINE   Percent frequency of visibilities <2 nautical miles

The percentage of visibility equal to or greater than a given value can be obtained from the graph by subtracting the cumulative percent frequency of that value from 100%. Visibility at sea is difficult to measure because of the lack of reference points. Also, some observers seem to report reduced visibilities at night because of darkness, though this tendency has abated in recent years. The coarseness of the coding intervals, however, tends to minimize serious biases in the summarized data. Visibilities greater than 25 nmi should be interpreted cautiously because the earth's curvature makes it impossible to see 25 nmi horizontally from the bridges of most ships.

Buhta Providenya

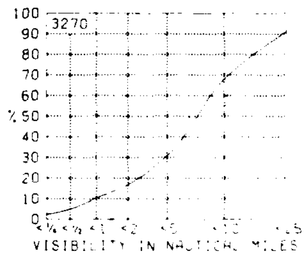


Gambell



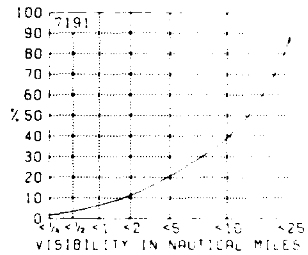
N	NE	E	SE	S	SW	W	NW	C
20	24	23	29	17	15*	15*	13*	3*

Northeast Cape



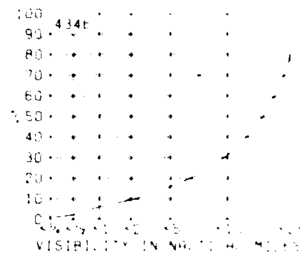
N	NE	E	SE	S	SW	W	NW	C
14	22	24	39	34	[illegible]	[illegible]	18	[illegible]

Nome



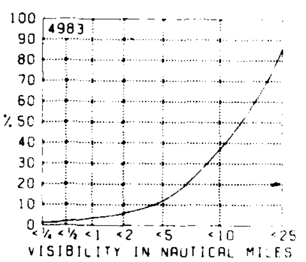
N	NE	E	SE	S	SW	W	NW	C
4	9	22	30	22	16	6	3	4

Moses Point



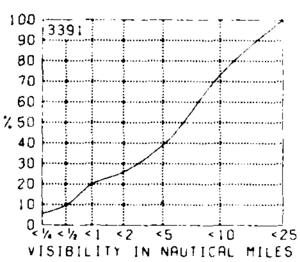
N	NE	E	SE	S	SW	W	NW	C
[illegible]	6	6	30	32	[illegible]	[illegible]	[illegible]	[illegible]

Unalakleet



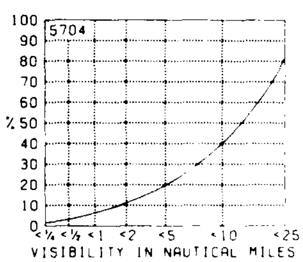
N	NE	E	SE	S	SW	W	NW	C
2	4	5	4	13	13	7	4	5

Cape Romanzof



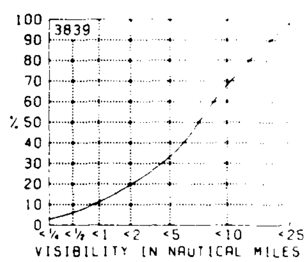
N	NE	E	SE	S	SW	W	NW	C
31	23	27	36	39	34	23	2	8

Bethel



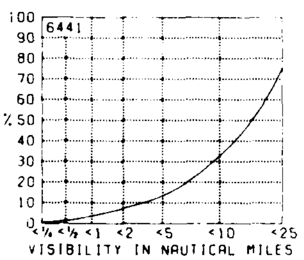
N	NE	E	SE	S	SW	W	NW	C
6	7	10	18	23	21	14	7	9

Cape Newenham



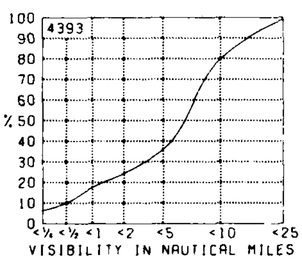
N	NE	E	SE	S	SW	W	NW	C
11	16	26	29	23	23	35	16	11

King Salmon



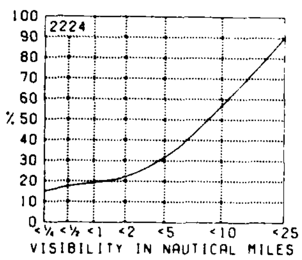
N	NE	E	SE	S	SW	W	NW	C
3	4	6	7	13	19	12	5	8

St. Paul



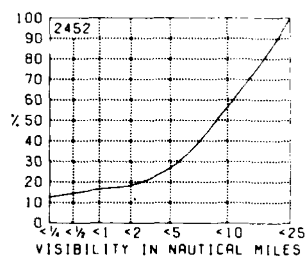
N	NE	E	SE	S	SW	W	NW	C
26	29	34	25	20	16	12	17	22

Port Moller

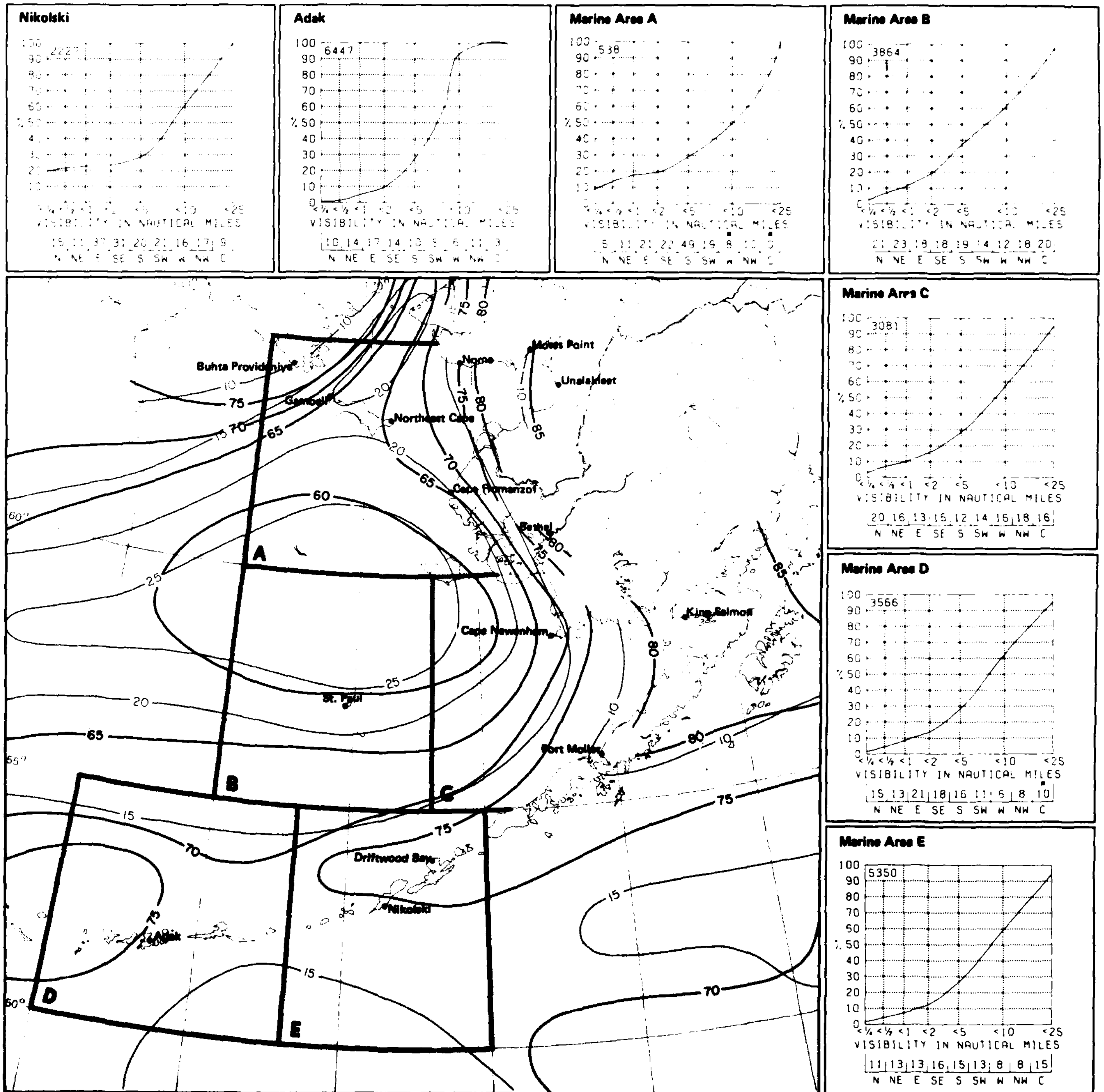


N	NE	E	SE	S	SW	W	NW	C
22	15	24	16	13	41	50	30	19

Driftwood Bay



N	NE	E	SE	S	SW	W	NW	C
34	32	25	13	11	24	24	23	11



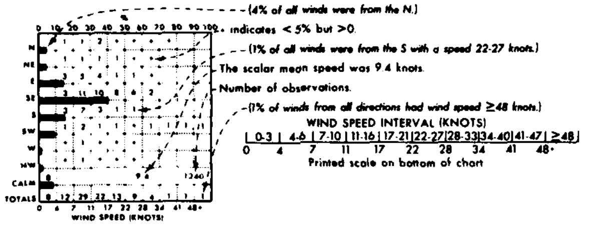
8 Visibility thresholds

March

Legend

Wind speed/direction

Direction frequency (top scale): Bars represent percent frequency of winds observed from each direction. Speed frequency (bottom scale): Printed figures represent percent frequency of wind speeds observed from each direction.



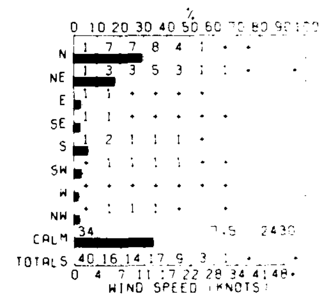
Map - Wind speed thresholds

BLACK LINE - Percent frequency of wind speed ≤10 knots (≤12 mph)

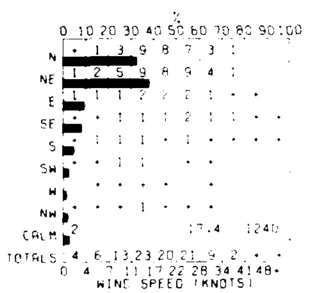
BLUE LINE - Percent frequency of wind speed ≥34 knots (≥39 mph)

The scalar mean wind speed on the graph is based on the number of observations reporting a wind speed with direction. The sum of the totals line provides the cumulative percent frequency of wind speed below a selected threshold value. In the example graph, 71% of all winds were less than 17 knots (20 mph)

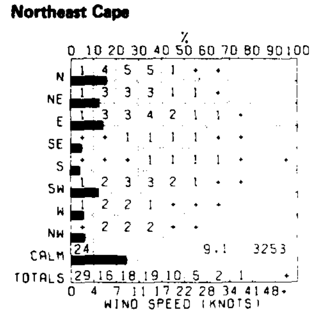
Buhta Providenlya



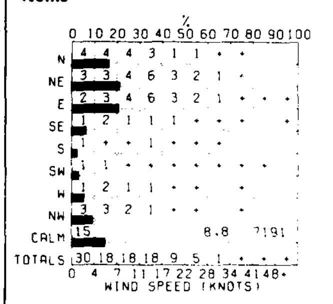
Gambell



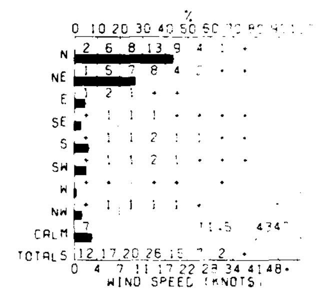
Northeast Cape



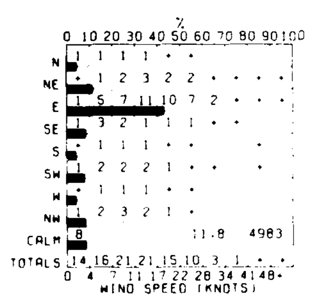
Nome



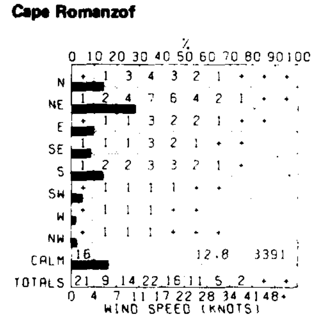
Moses Point



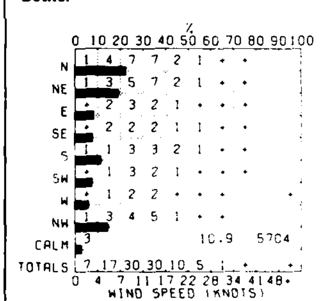
Unalakleet



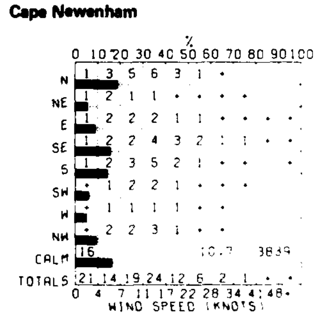
Cape Romanzof



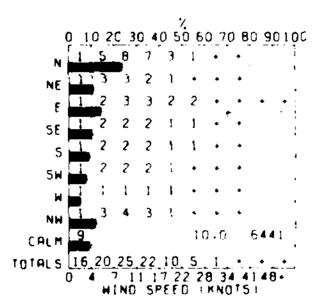
Bethel



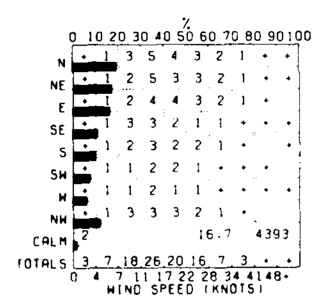
Cape Newenham



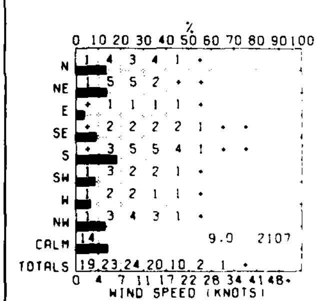
King Salmon



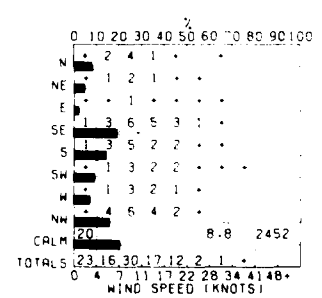
St. Paul

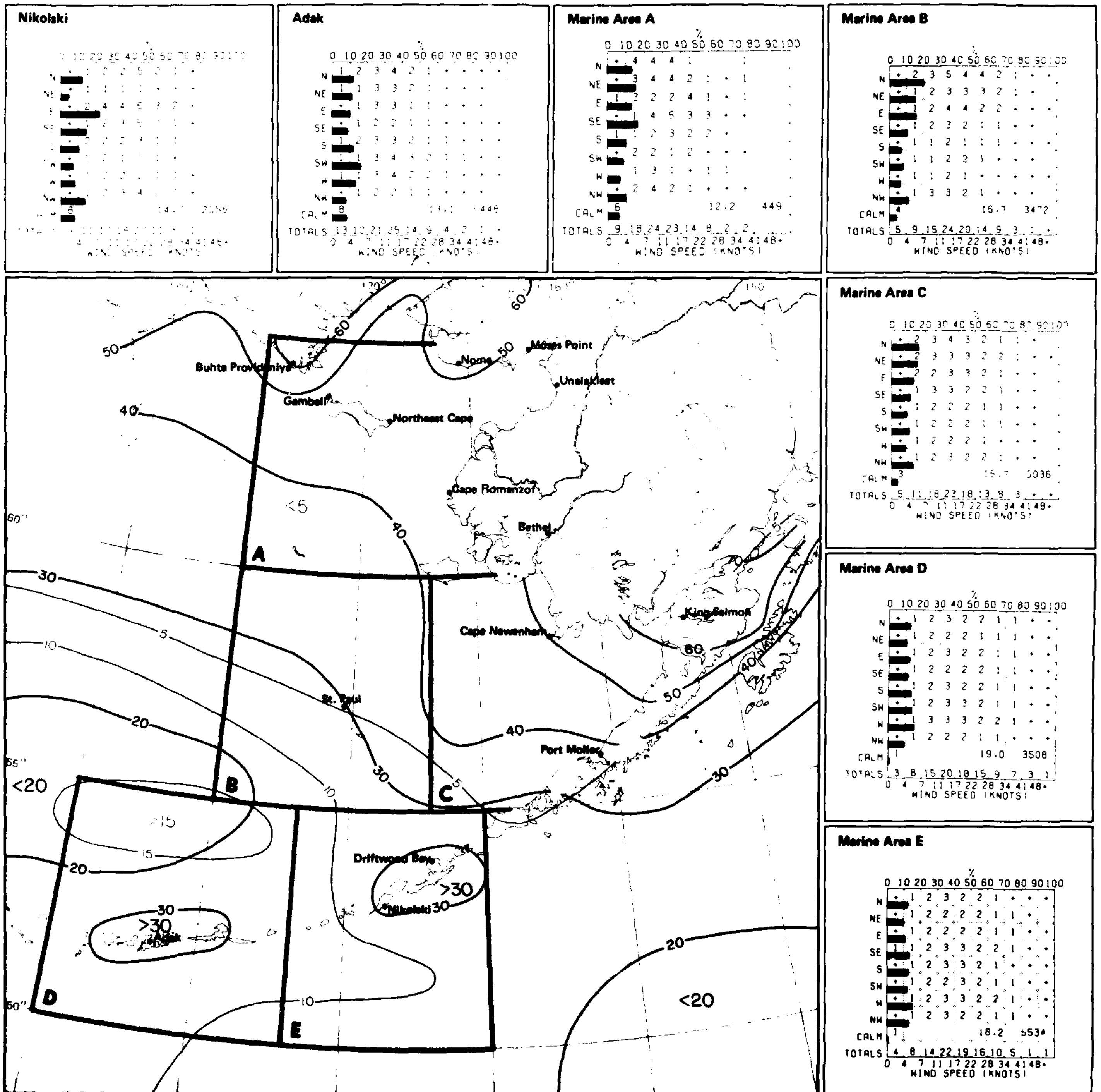


Port Moller



Driftwood Bay

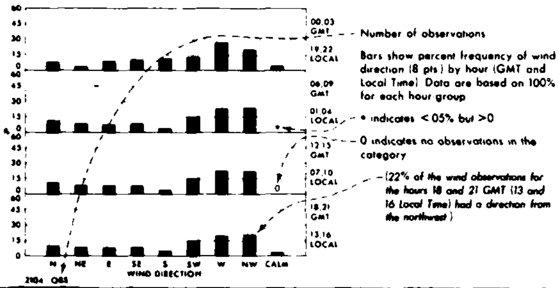




9 Wind speed thresholds **March**

Legend

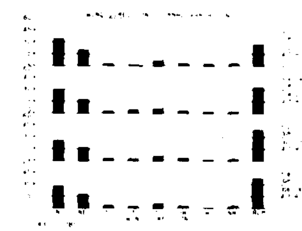
Wind direction/diurnal variation



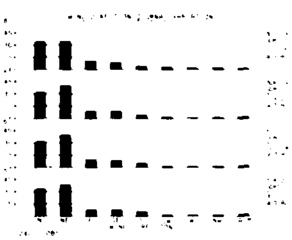
Map - Vector mean wind

10 2 Direction of flow toward station dot, vector magnitude in knots (example vector mean wind is from northeast at 10 2 knots or 11.7 mph)

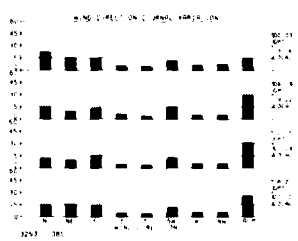
Buhta Provideniya



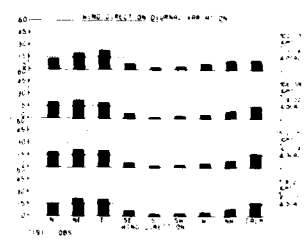
Gambell



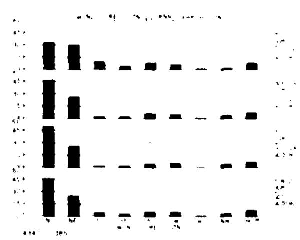
Northeast Cape



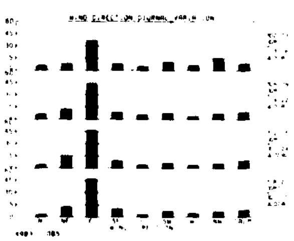
Nome



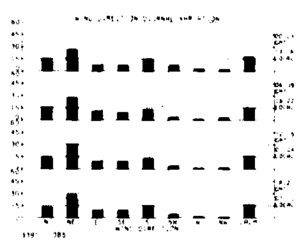
Moses Point



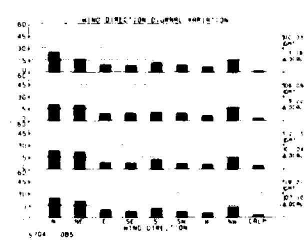
Unalakleet



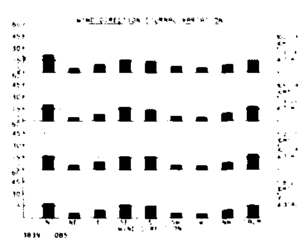
Cape Romanzof



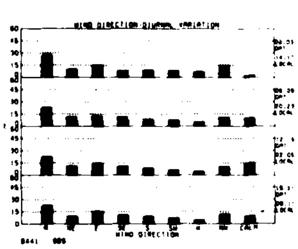
Bethel



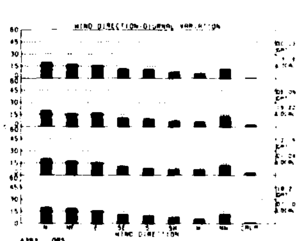
Cape Newenham



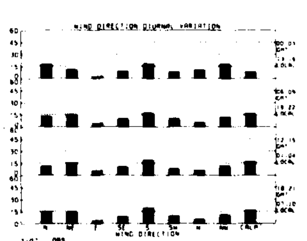
King Salmon



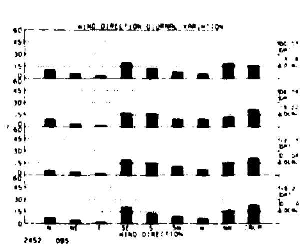
St. Paul

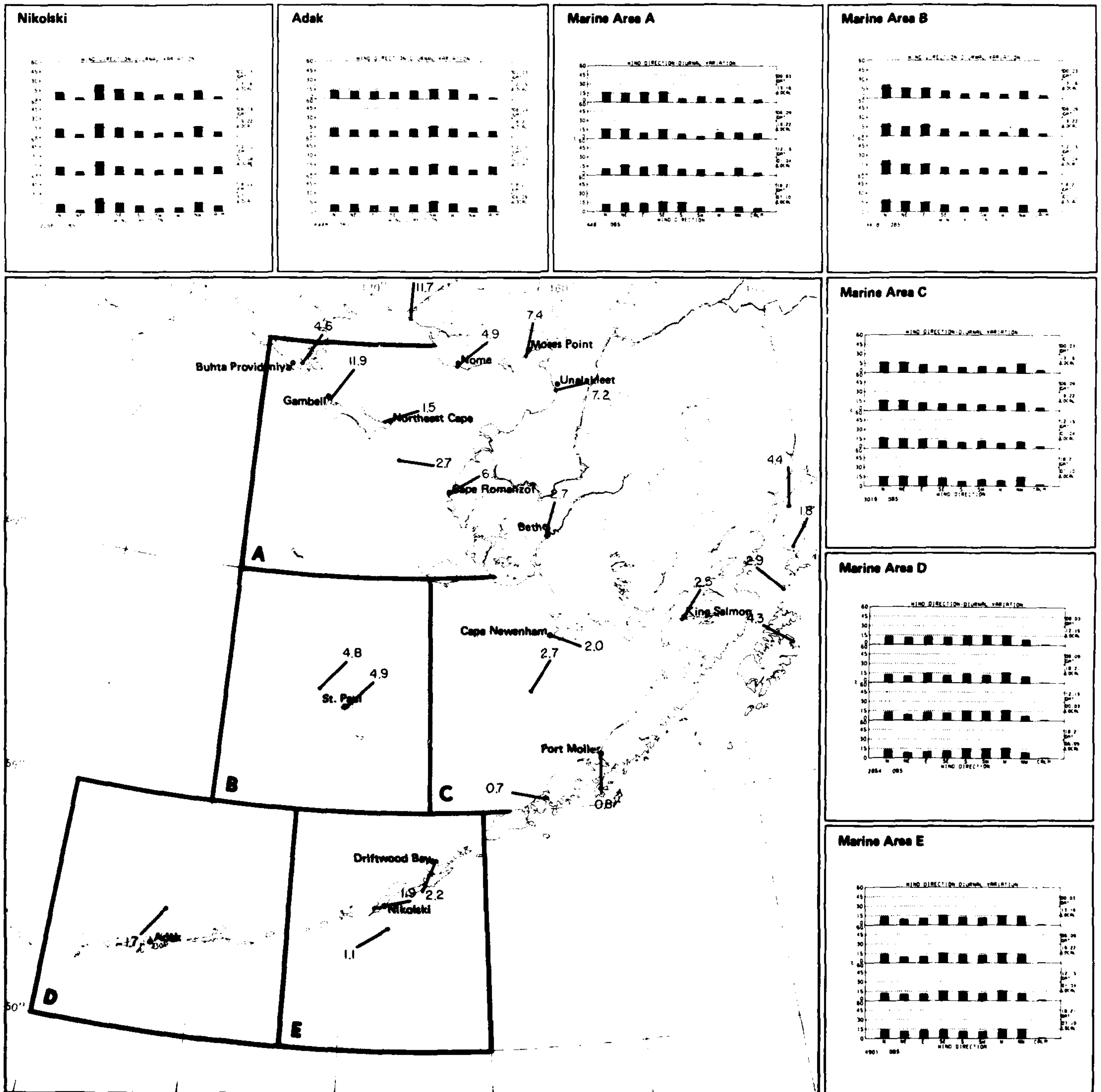


Port Moller



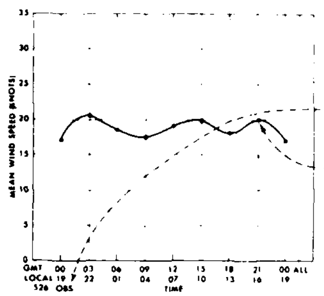
Driftwood Bay





10 Vector mean wind **March**

Legend — **Wind speed/diurnal variation**



Number of observations

Mean wind speed (knots) by hour (GMT and Local Time) and for all hours

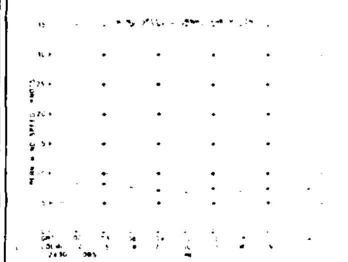
(The mean wind speed for the hour 21 GMT (16 Local) was 20 knots.)

Map - Scalar mean wind

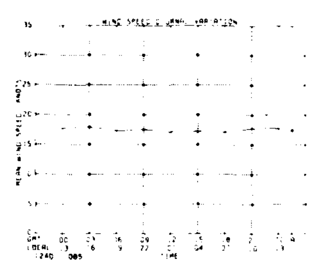
BLACK LINE Scalar mean wind (knots)

In areas of high persistence of direction, the magnitude of the vector mean winds should closely approach that of the scalar mean winds. As most of the marine observations are recorded at six hour intervals, disregard the plots for other than 00, 06, 12, 18, GMT hours on the marine area graphs.

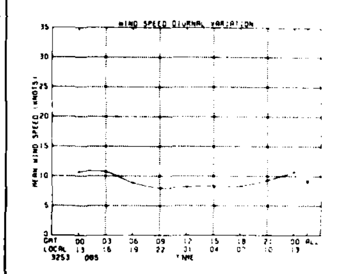
Buhta Providenyia



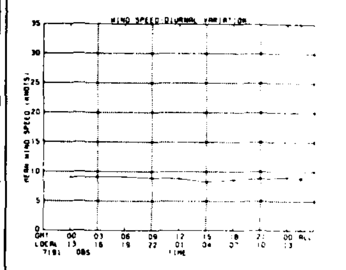
Gambell



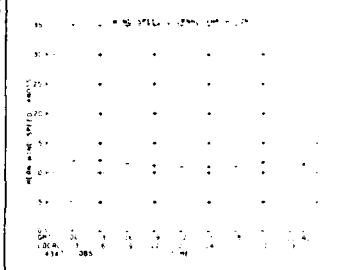
Northeast Cape



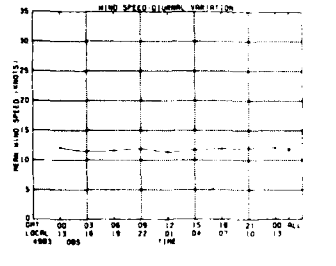
Nome



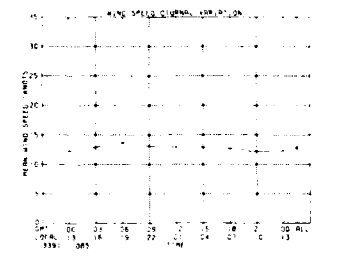
Moses Point



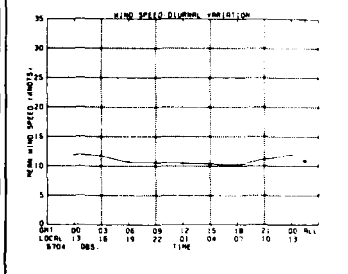
Unalakleet



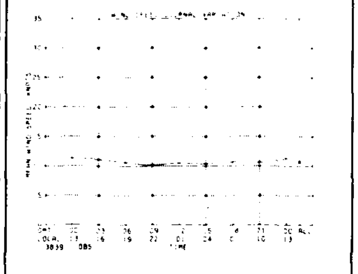
Cape Romanzof



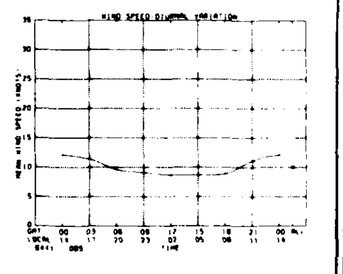
Bethel



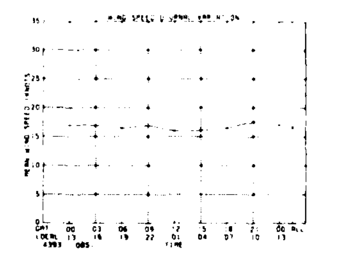
Cape Newenham



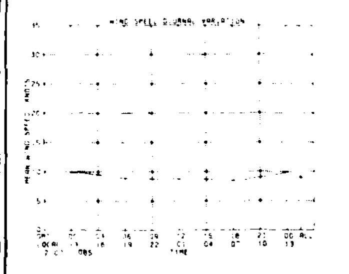
King Salmon



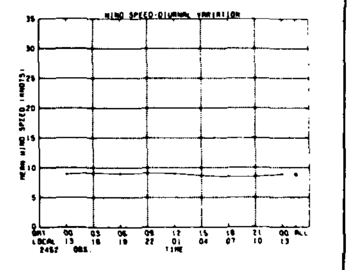
St. Paul

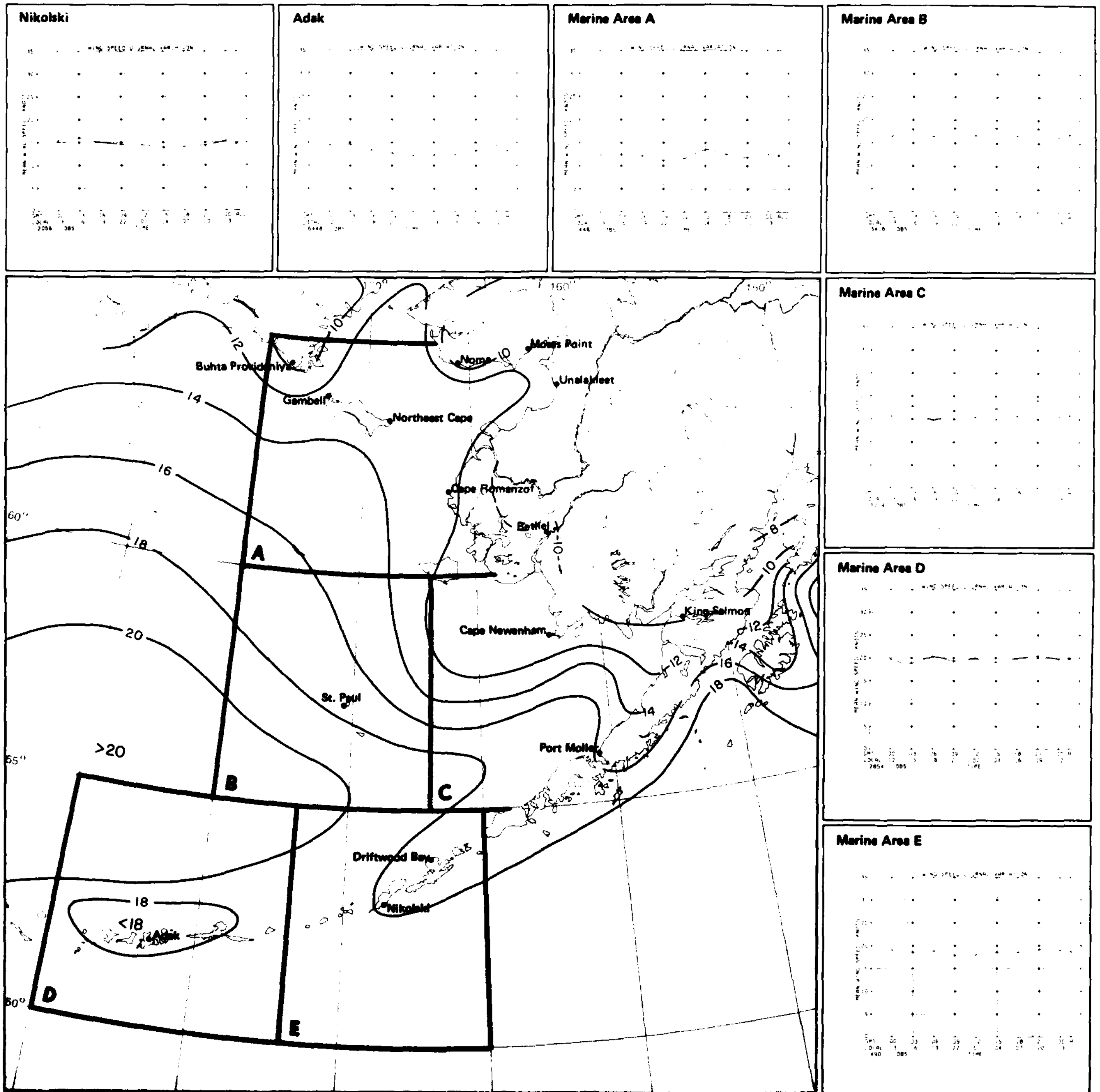


Port Moller



Driftwood Bay

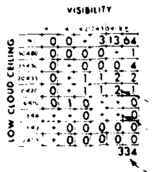




11 Scalar mean wind **March**

Legend

Low cloud ceiling/visibility



Percent frequency of simultaneous occurrence of specified low cloud ceilings (hundreds of feet) and visibilities (nautical miles).

Low cloud ceiling heights are estimated from the height of low clouds (h) when low cloud amount (N_h) is ≥5/8

Obscurations are included under ceiling 0<1.5

N C (no ceiling) includes bases of clouds ≥8000 feet as well as occurrences of N_h <5/8

(2% of all observations reported ceiling ≥1000 but <2000 feet simultaneously with visibility ≥5 but <10 nautical miles)

• indicates <1% but >0

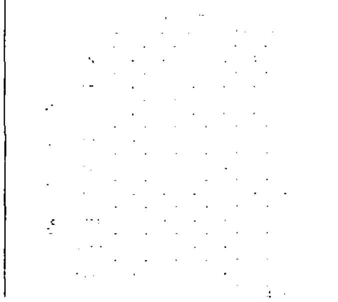
Number of observations

Map - Low cloud ceiling and visibility thresholds

BLACK LINE Percent frequency of low cloud ceiling ≥1000 feet (or no low cloud ceiling) and visibility ≥5 nautical miles

BLUE LINE Percent frequency of low cloud ceiling <600 feet and/or visibility <2 nautical miles

Buhta Providenciya



Gambell

LOW CLOUD CEILING \ VISIBILITY	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	•	•	1	3	12	33
50<80	0	•	0	•	•	1
35<50	0	•	•	•	1	•
20<35	•	1	•	1	2	1
10<20	1	2	3	6	7	2
6<10	1	2	3	3	4	•
3<6	•	•	•	1	1	•
1.5<3	0	0	0	0	0	0
0<1.5	5	2	•	•	0	0

1236

Northeast Cape

LOW CLOUD CEILING \ VISIBILITY	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	•	1	1	3	19	35
50<80	0	•	0	•	•	•
35<50	0	0	0	•	•	•
20<35	•	•	•	1	2	1
10<20	•	•	2	4	8	2
6<10	•	1	1	2	2	•
3<6	•	•	•	•	•	0
1.5<3	0	0	0	0	0	0
0<1.5	4	2	1	•	0	0

2092

Nome

LOW CLOUD CEILING \ VISIBILITY	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	•	•	•	1	9	54
50<80	•	•	•	•	1	2
35<50	•	•	•	•	1	2
20<35	•	•	•	2	3	2
10<20	•	1	1	2	3	1
6<10	•	•	1	2	1	•
3<6	•	•	1	1	•	•
1.5<3	•	•	•	•	0	0
0<1.5	2	1	1	•	•	0

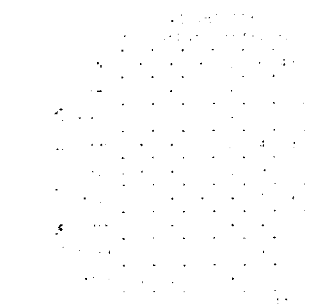
6871

Moses Point

LOW CLOUD CEILING \ VISIBILITY	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	0	0	0	1	2	44
50<80	0	0	0	•	•	3
35<50	•	0	0	0	•	2
20<35	0	0	1	1	[illegible]	8
10<20	0	1	2	6	2	2
6<10	0	0	0	0	0	0
3<6	0	0	0	0	0	0
1.5<3	0	0	0	0	0	0
0<1.5	9	4	3	1	0	0

246

Unalakleet



Cape Romanzof

LOW CLOUD CEILING \ VISIBILITY	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	2	3	1	5	25	20
50<80	•	•	•	•	2	1
35<50	0	•	•	•	1	•
20<35	1	1	•	1	4	1
10<20	1	1	1	3	3	•
6<10	1	2	2	3	3	•
3<6	•	1	1	1	1	0
1.5<3	0	0	0	0	0	0
0<1.5	7	3	•	•	0	0

2272

Bethel

LOW CLOUD CEILING \ VISIBILITY	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	•	•	•	2	9	49
50<80	•	•	•	•	1	3
35<50	0	•	•	•	1	2
20<35	•	•	•	1	3	3
10<20	•	•	1	2	4	2
6<10	•	•	1	2	2	1
3<6	•	•	•	1	1	•
1.5<3	0	•	•	•	•	0
0<1.5	2	2	2	1	•	0

5699

Cape Newenham

LOW CLOUD CEILING \ VISIBILITY	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	•	•	0	1	21	23
50<80	0	•	0	0	•	•
35<50	0	0	0	0	•	•
20<35	•	0	•	1	2	2
10<20	•	•	1	4	9	4
6<10	•	1	2	3	6	2
3<6	•	1	1	2	1	•
1.5<3	•	0	•	0	0	0
0<1.5	6	2	2	1	•	0

2253

King Salmon

LOW CLOUD CEILING \ VISIBILITY	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	•	•	•	1	7	51
50<80	0	•	•	•	1	4
35<50	0	0	•	•	2	3
20<35	•	•	•	1	3	5
10<20	•	•	1	2	4	3
6<10	•	•	1	1	2	1
3<6	•	•	•	1	1	•
1.5<3	•	•	•	•	•	•
0<1.5	1	1	1	•	•	•

6408

St. Paul

LOW CLOUD CEILING \ VISIBILITY	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	1	•	1	2	18	12
50<80	0	0	0	•	•	•
35<50	•	•	0	•	1	1
20<35	•	•	•	1	6	3
10<20	2	2	2	5	14	3
6<10	1	2	1	2	4	•
3<6	1	2	2	2	1	•
1.5<3	•	•	•	•	•	0
0<1.5	5	1	•	•	0	0

4126

Port Moller

Insufficient Data

Driftwood Bay

Insufficient Data

Nikolski

Insufficient Data

Adak

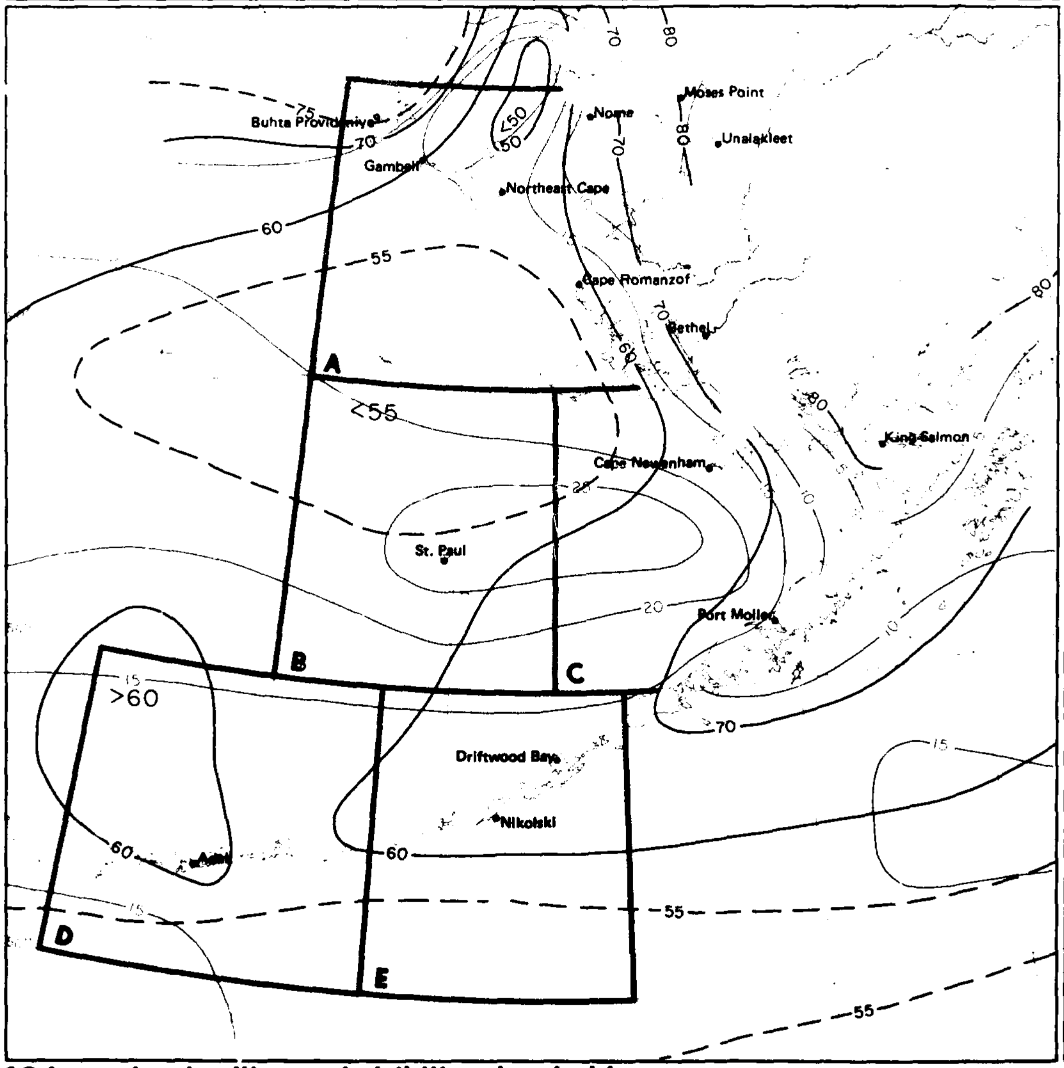
VISIBILITY

	<½	½<1	1<2	2<5	5<10	≥10
NC	1	.	.	1	13	4
50<80	1	0	0	[illegible]	.	.
35<50	0	0	.	.	4	1
20<35	.	.	.	3	28	2
10<20		.	1	5	17	.
6<10	0	.	1	4	8	.
3<6	0	.	.	1	.	0
1.5<3	0	.	[illegible]	.	0	0
0<1.5	1	3	2	1	.	0

6440

Marine Area A

Marine Area B



Marine Area C

Marine Area D

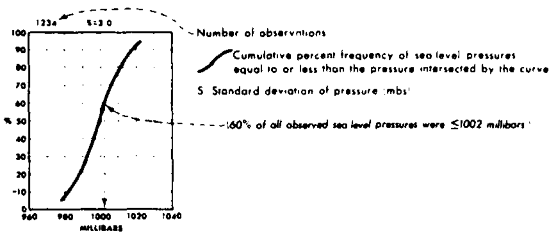
Marine Area E

12 Low cloud ceiling and visibility thresholds

March

Legend

Sea level pressure

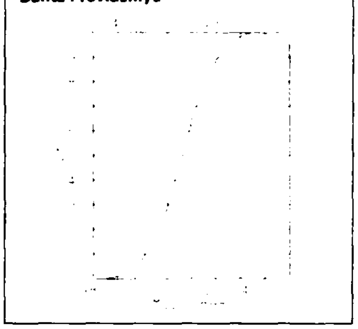


Map - Mean sea level pressure

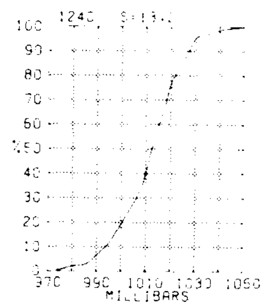
BLACK LINE Mean sea level pressure (millibars)

Sea level pressure is one of the most frequently recorded elements but one of the least accurate because of instrument and coding errors. Despite the inaccuracies of the individual readings, however the large scale patterns and mean gradients of the isopleth analyses are relatively accurate.

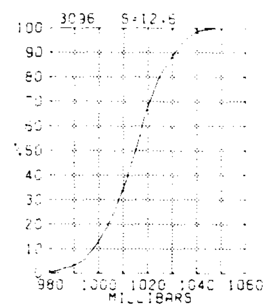
Buhta Provideniya



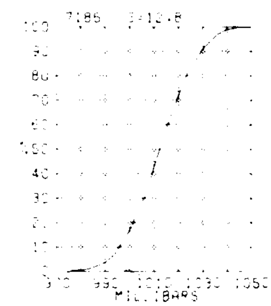
Gambell



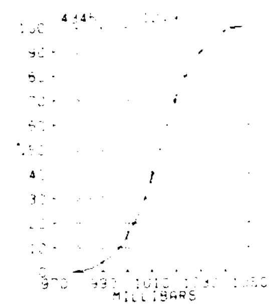
Northeast Cape



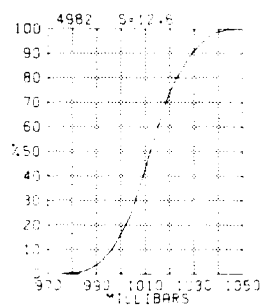
Nome



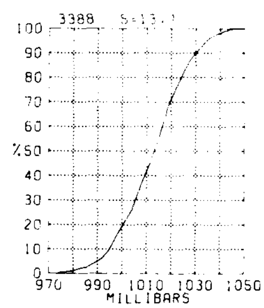
Moses Point



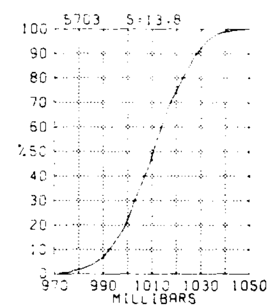
Unalakleet



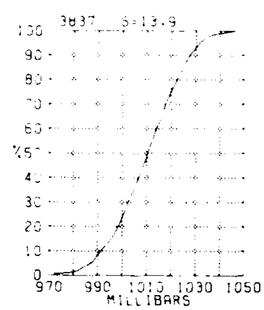
Cape Romanzof



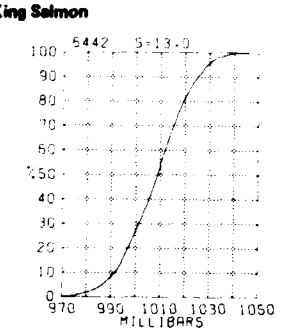
Bethel



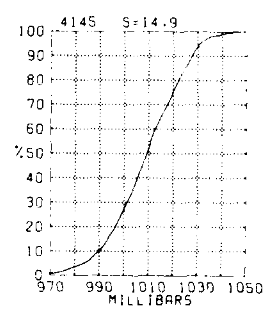
Cape Newenham



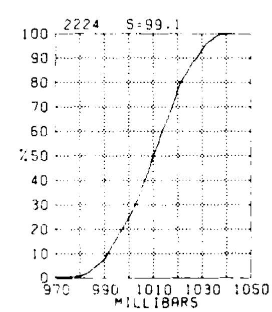
King Salmon



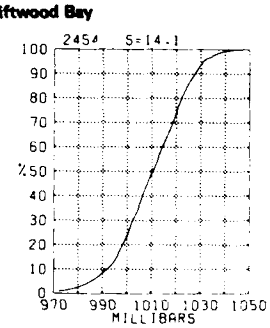
St. Paul

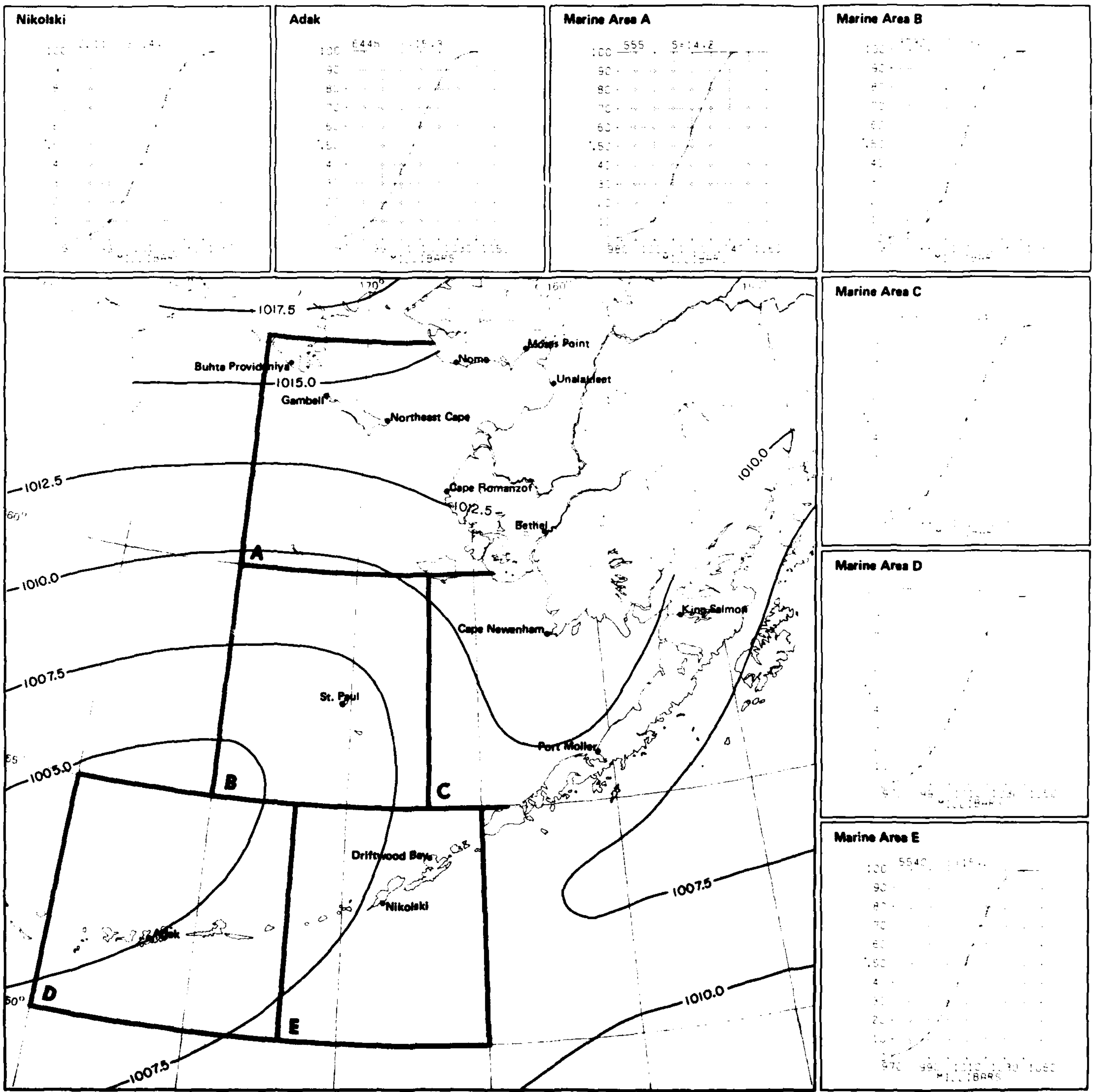


Port Moller



Driftwood Bay

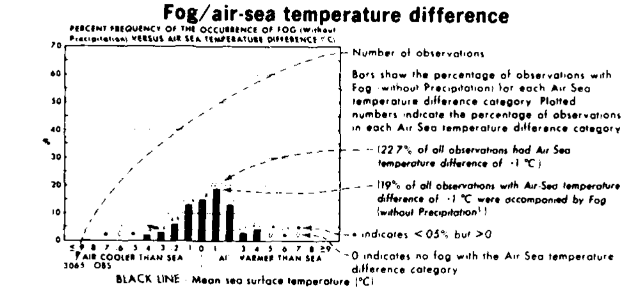




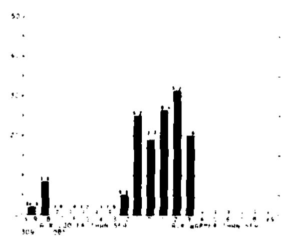
13 Mean sea level pressure **March**

Legend

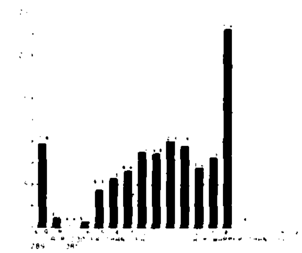
Fog/air-sea temperature difference



Marine Area A

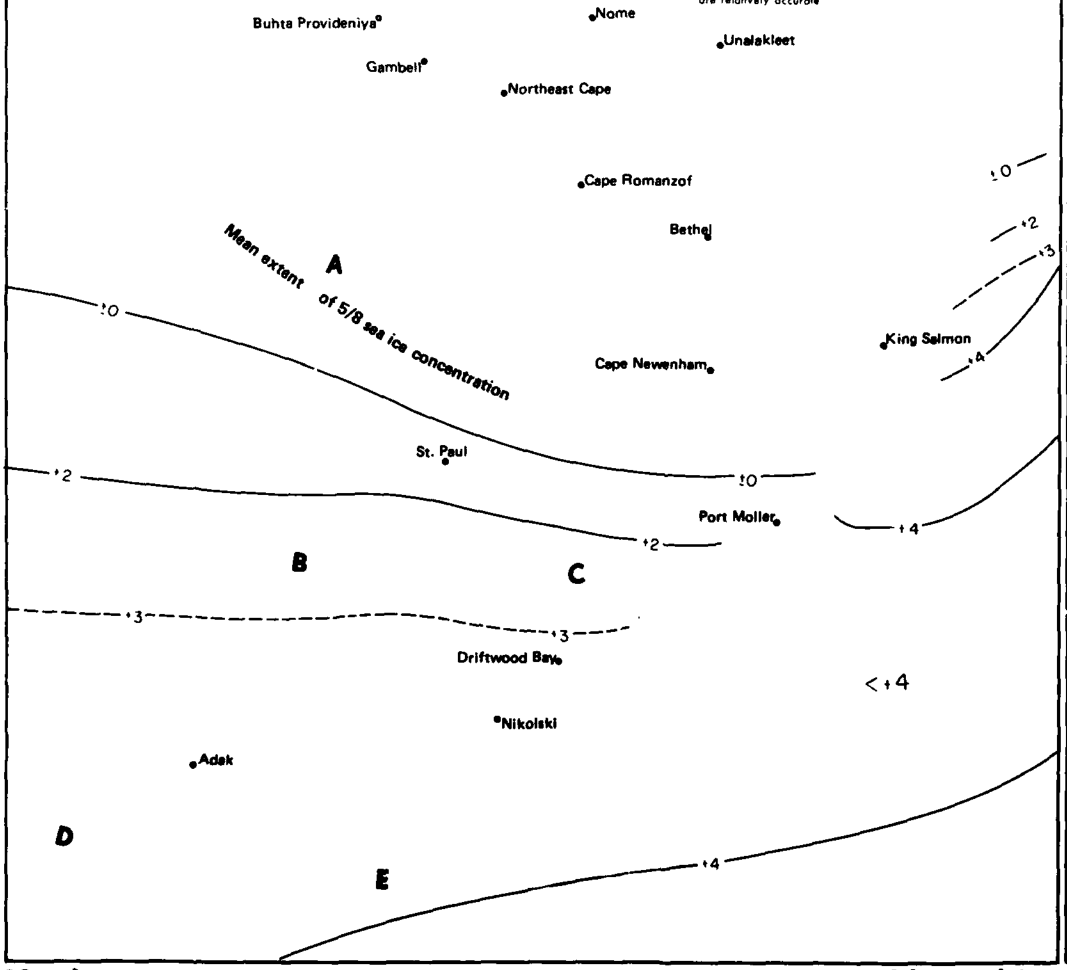


Marine Area B

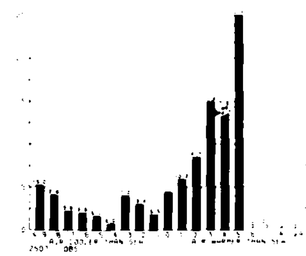


Map - Mean sea surface temperature

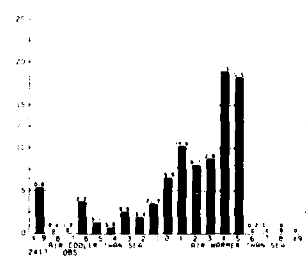
Sea surface temperature is recorded frequently in marine observations, the various methods of recording tend to decrease the reliability of individual values. Despite the inaccuracies, the large-scale patterns and mean gradients of the isopleth analyses are relatively accurate



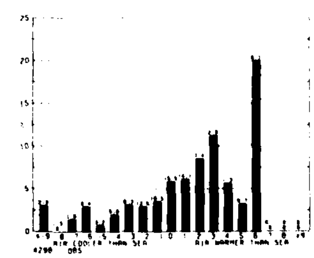
Marine Area C



Marine Area D



Marine Area E

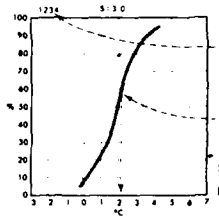


March

14 Fog/air-sea temperature difference
Mean sea surface temperature

Legend

Sea surface temperature



Number of observations

Cumulative percent frequency of sea surface temperatures equal to or less than the temperature intersected by the curve

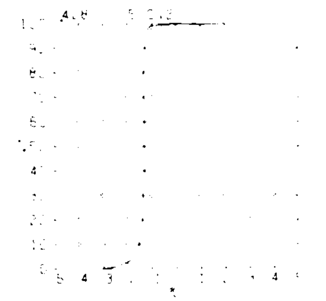
(60% of all observed sea surface temperatures were ≤2.1°C or ≤35.8°F)

S: Standard deviation of sea surface temperatures (°C)

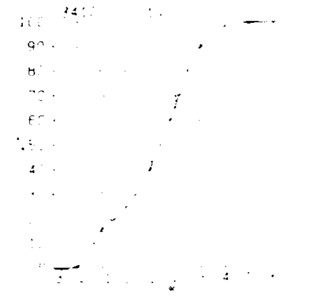
BLACK LINE   Maximum (99%) sea surface temperature (°C) (1% of the temperatures were greater than the given value)

BLUE LINE   Minimum (1%) sea surface temperature (°C) (1% of the temperatures were equal to or less than the given value)

Marine Area A

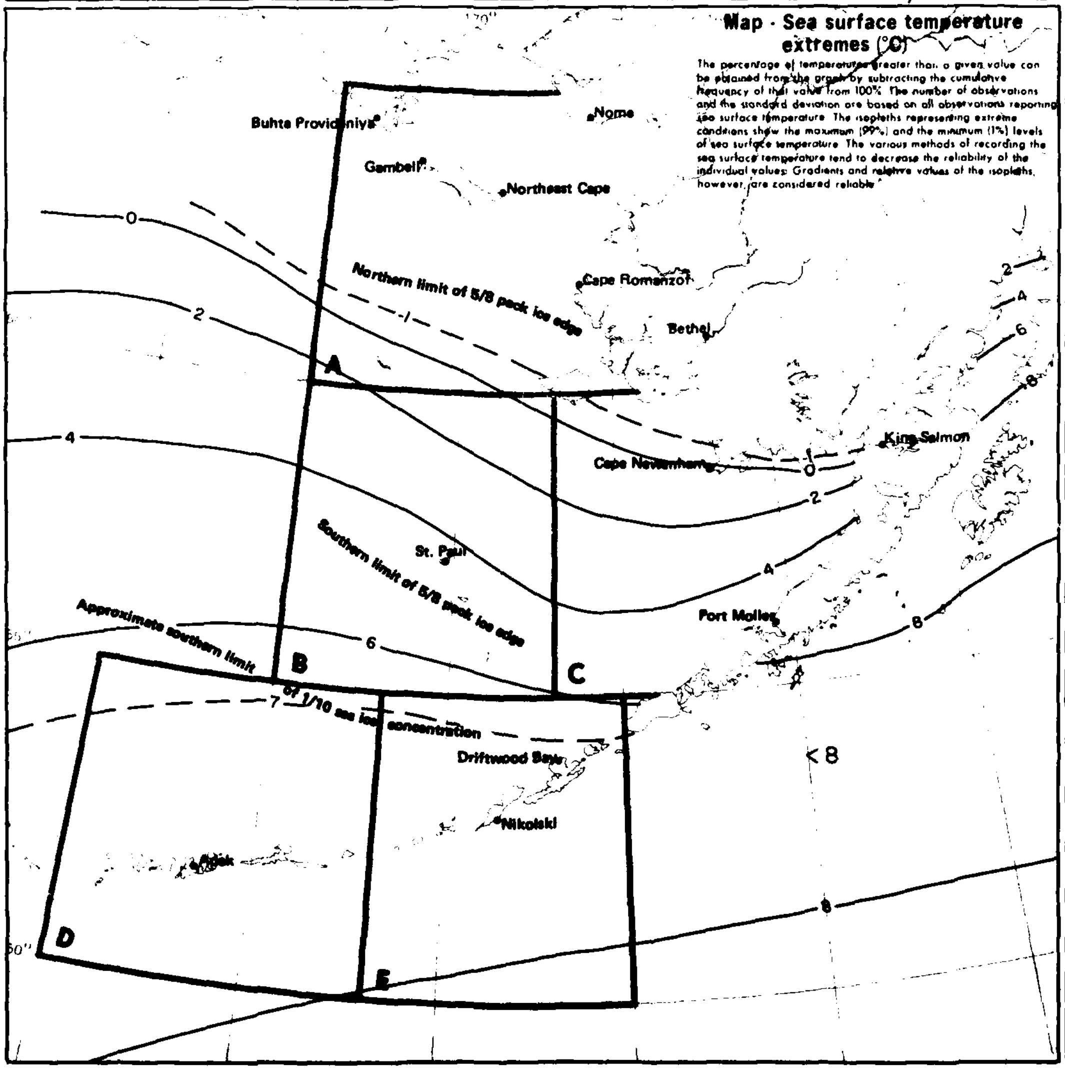


Marine Area B

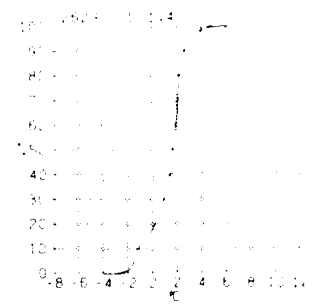


Map - Sea surface temperature extremes (°C)

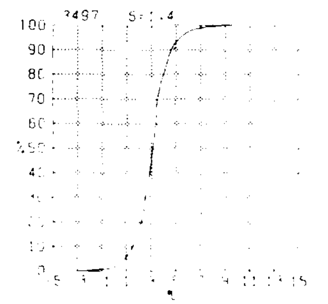
The percentage of temperatures greater than a given value can be obtained from the graph by subtracting the cumulative frequency of that value from 100%. The number of observations and the standard deviation are based on all observations reporting sea surface temperature. The isopleths representing extreme conditions show the maximum (99%) and the minimum (1%) levels of sea surface temperature. The various methods of recording the sea surface temperature tend to decrease the reliability of the individual values. Gradients and relative values of the isopleths, however, are considered reliable.



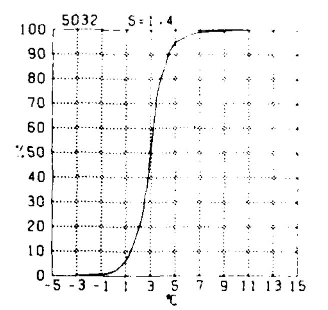
Marine Area C



Marine Area D



Marine Area E



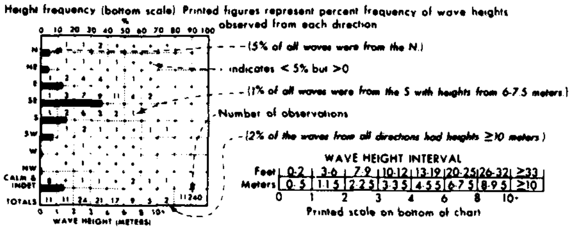
15 Sea surface temperature extremes

March

Legend — Wave height/direction

Direction frequency (top scale) Bars represent percent frequency of waves from each direction

Height frequency (bottom scale) Printed figures represent percent frequency of wave heights observed from each direction



WAVE HEIGHT INTERVAL

Feet	0-2	3-6	7-9	10-12	13-19	20-25	26-32	≥33
Meters	0-.5	1-1.5	2-2.5	3-3.5	4-5.5	6-7.5	8-9.5	≥10

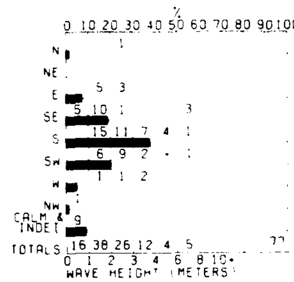
0 1 2 3 4 6 8 10+

Printed scale on bottom of chart

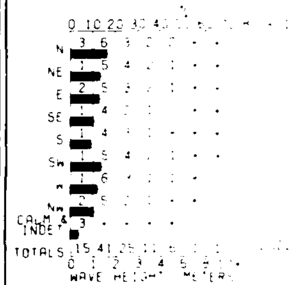
BLACK LINE - Percent frequency of wave height <1.5 meters (<5 feet)

BLUE LINE - Percent frequency of wave height <2.5 meters (<8 feet)

Marine Area A

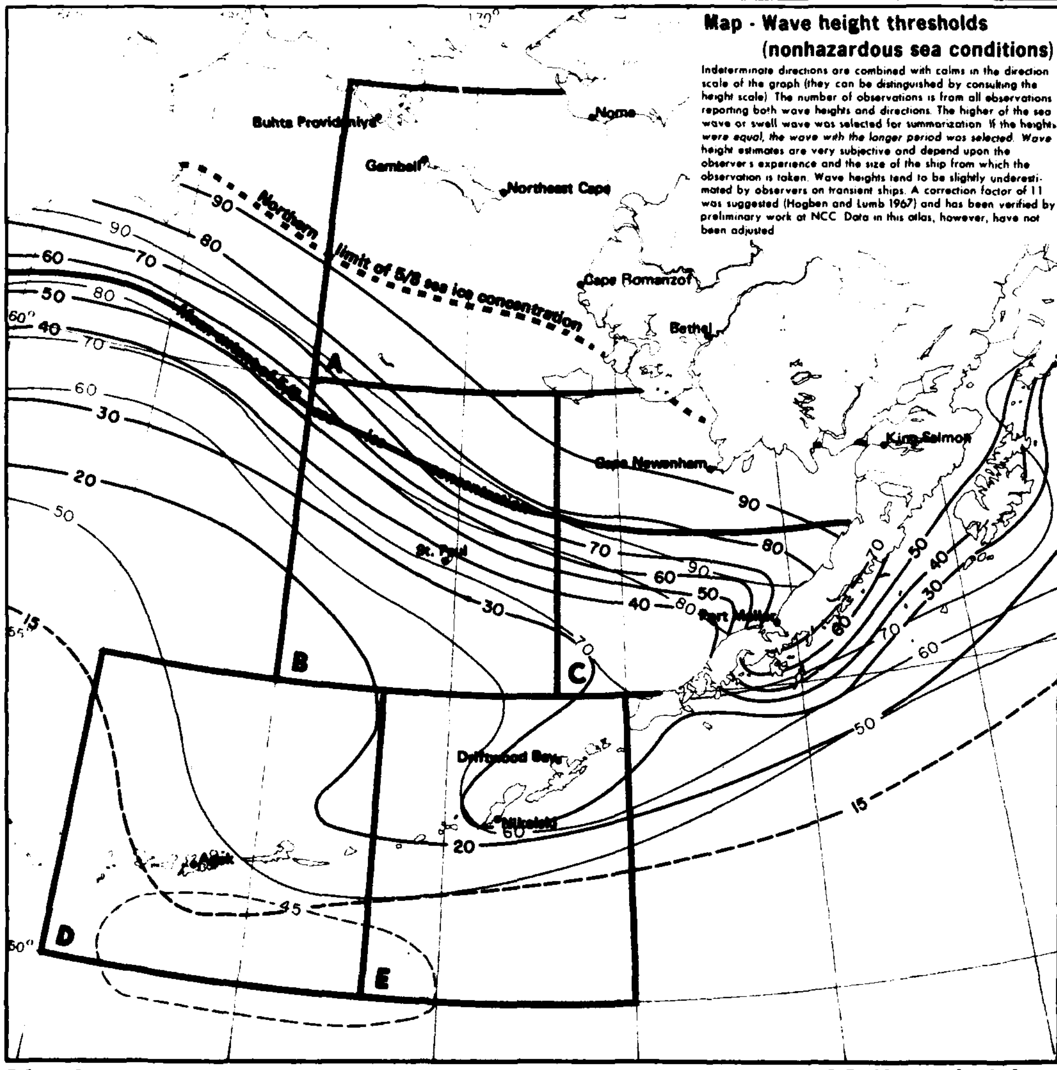


Marine Area B

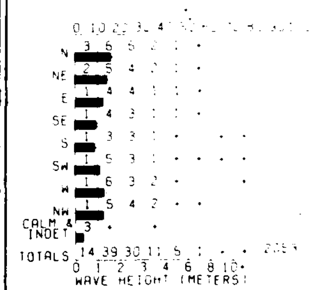


Map - Wave height thresholds (nonhazardous sea conditions)

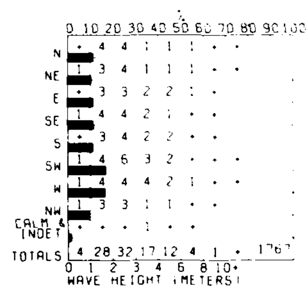
Indeterminate directions are combined with calms in the direction scale of the graph (they can be distinguished by consulting the height scale). The number of observations is from all observations reporting both wave heights and directions. The higher of the sea wave or swell wave was selected for summarization. If the heights were equal, the wave with the longer period was selected. Wave height estimates are very subjective and depend upon the observer's experience and the size of the ship from which the observation is taken. Wave heights tend to be slightly underestimated by observers on transient ships. A correction factor of 1.1 was suggested (Hogben and Lumb 1967) and has been verified by preliminary work at NCC. Data in this atlas, however, have not been adjusted.



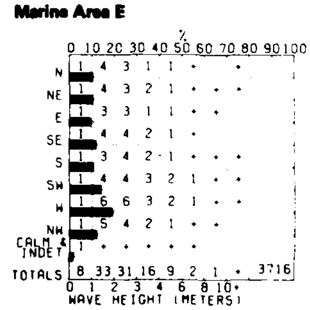
Marine Area C



Marine Area D

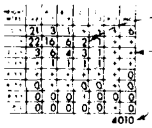


Marine Area E



Legend

Wave height/period



Percent frequency of occurrence of wave period and height

(2% of observed waves had a height of 1-1.5 meters and a period of 10-11 seconds)

• indicates < 5% but >0

Number of observations

Waves are selected on the basis of the higher of sea and swell when both are reported. If both heights are equal the wave with the longer period is selected.

BLACK LINE — Percent frequency of wave height ≥3.5 meters (≥12 feet)

BLUE LINE — Percent frequency of wave height ≥6 meters (≥20 feet)

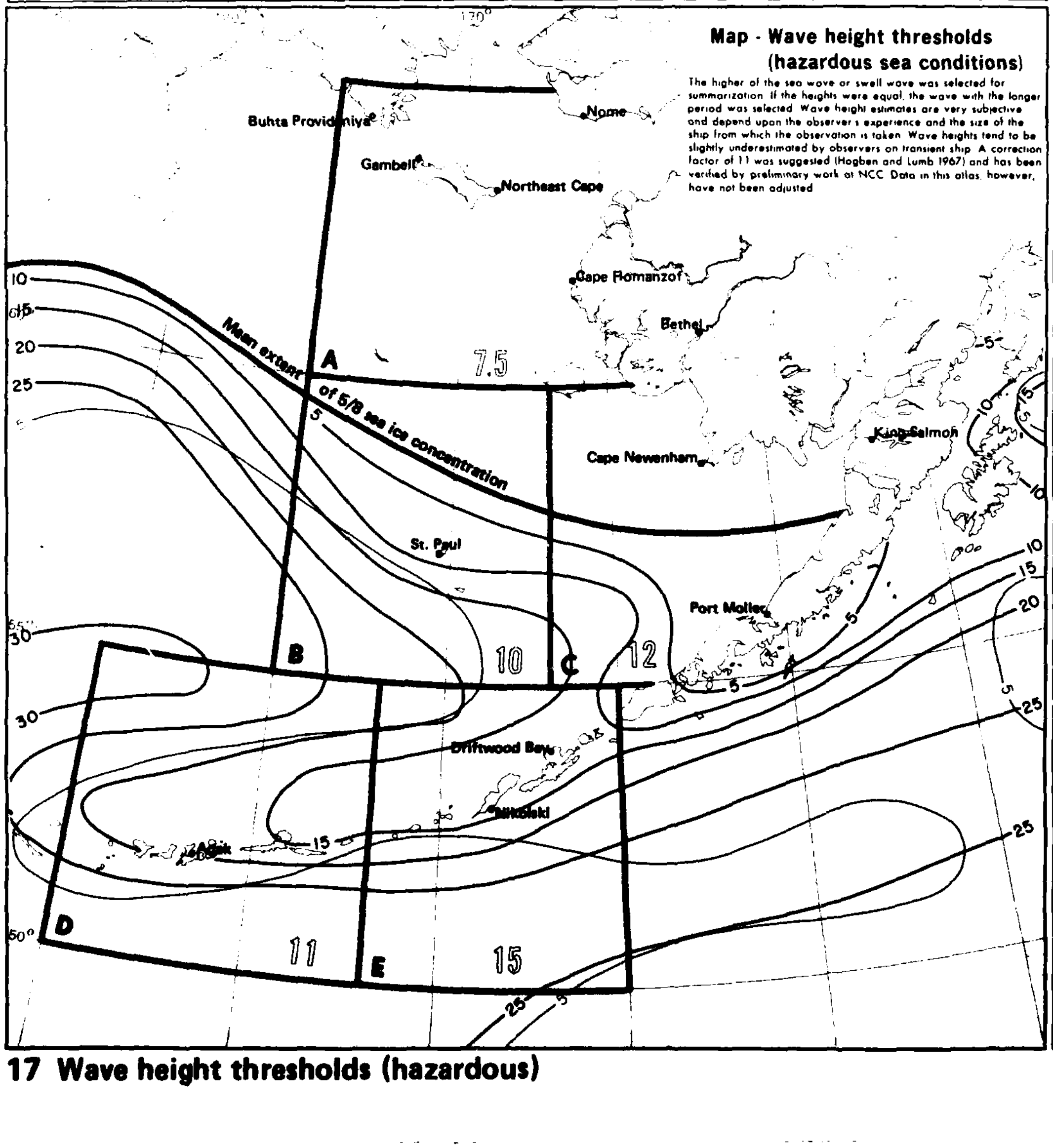
BLUE NUMBER — Maximum observed wave height (meters)

Marine Area A

Marine Area B

Map - Wave height thresholds (hazardous sea conditions)

The higher of the sea wave or swell wave was selected for summarization. If the heights were equal, the wave with the longer period was selected. Wave height estimates are very subjective and depend upon the observer's experience and the size of the ship from which the observation is taken. Wave heights tend to be slightly underestimated by observers on transient ship. A correction factor of 1.1 was suggested (Hogben and Lumb 1967) and has been verified by preliminary work at NCC. Data in this atlas, however, have not been adjusted.



Marine Area C

Marine Area D

1788

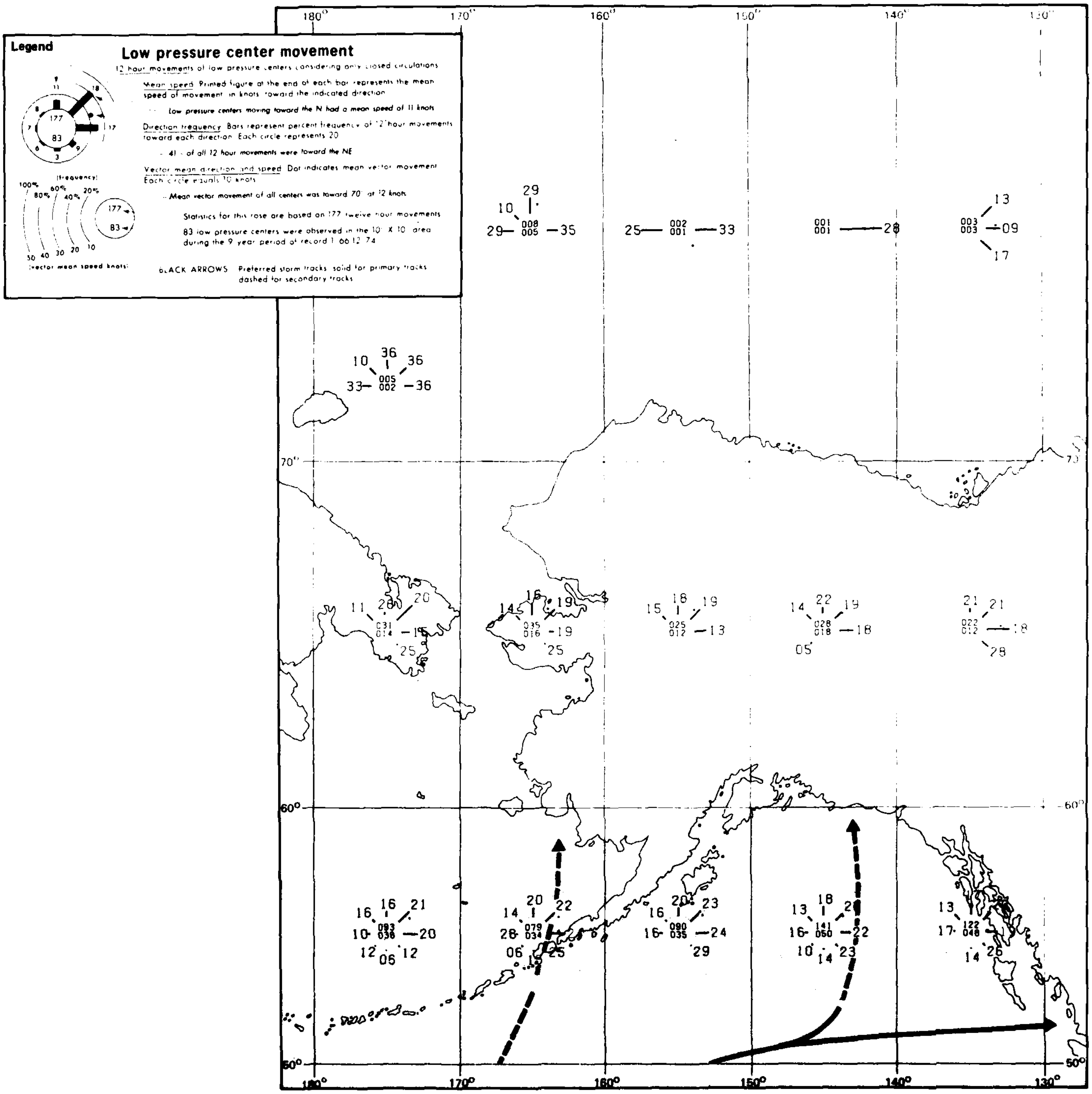
Marine Area E

PERIOD (SECONDS)

HEIGHT (MTRS)	<6	6-7	8-9	10-11	12-13	>13	IND
0-.5	6	1	•	•	0	0	2
1-1.5	12	13	5	1	•	•	1
2-2.5	5	13	8	3	1	•	1
3-3.5	2	6	4	2	1	•	•
4-5.5	•	2	3	2	1	1	•
6-7.5	0	•	•	1	•	•	•
8-9.5	0	•	•	•	•	•	0
≥10	0	0	•	•	•	•	0

3758

17 Wave height thresholds (hazardous)

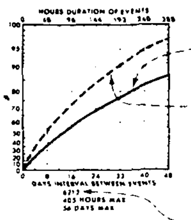


March

18 Low pressure center movement

Legend

Persistence of visibility <2 n. mi.



Hours duration of events   Days interval between events

Cumulative percent frequency of hours duration equal to or less than the number of hours intersected by the solid curve

(80% of the events had a duration ≤216 hours.)

Cumulative percent frequency of days interval between events equal to or less than the number of days intersected by the broken curve

(88% of the events were followed by another event in 28 days or less.)

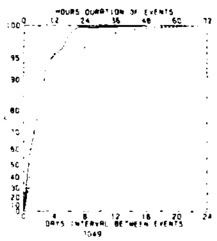
The maximum value(s) of hours duration and/or the days interval will be displayed when the graph limits are exceeded

Durations and intervals for a particular month extend from the time they begin (or the first of the month if already in progress) and are terminated at the actual ending time, regardless of what month that may be

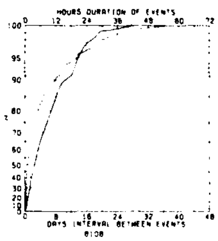
Number of observations

Top and bottom scales are variable to allow for variations in the data

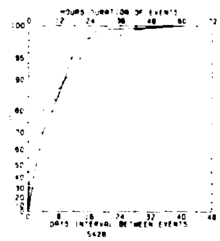
Adak



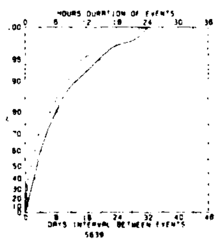
Nome



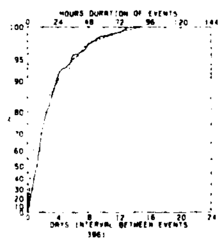
Moses Point



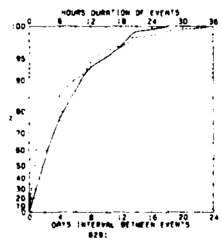
Unalakleet



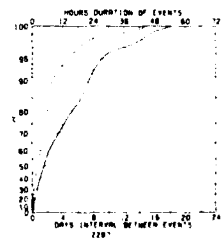
Cape Romanzof



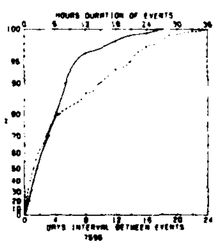
Bethel



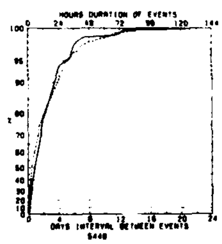
Nikolski



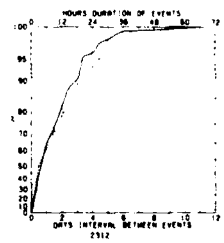
King Salmon



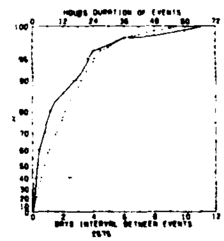
St. Paul



Port Moller



Driftwood Bay

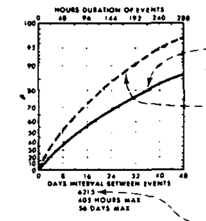


19 Persistence of visibility <2 n. mi. **March**

Legend

Persistence of wind ≥10 kts.

Hours duration of events · Days interval between events



Cumulative percent frequency of hours duration equal to or less than the number of hours intersected by the solid curve

(80% of the events had a duration ≤216 hours.)

Cumulative percent frequency of days interval between events equal to or less than the number of days intersected by the broken curve

(88% of the events were followed by another event in 28 days or less.)

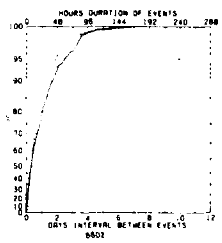
The maximum value(s) of hours duration and or the days interval will be displayed when the graph limits are exceeded

Durations and intervals for a particular month extend from the time they begin (or the first of the month if already in progress) and are terminated at the actual ending time, regardless of what month that may be

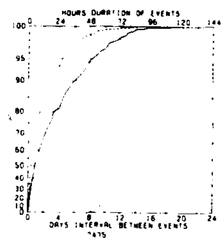
Number of observations

Top and bottom scales are variable to allow for variations in the data

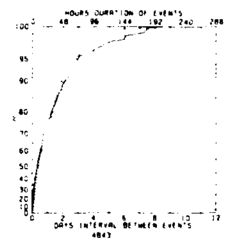
Adak



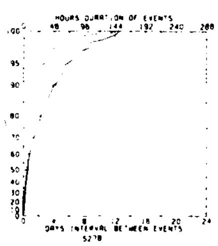
Nome



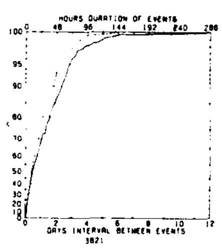
Moses Point



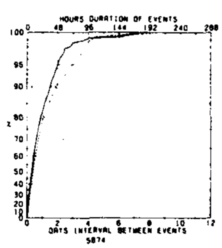
Unalakleet



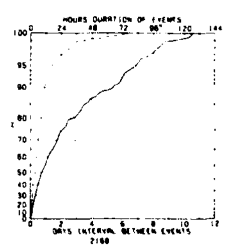
Cape Romanzof



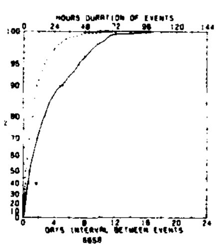
Bethel



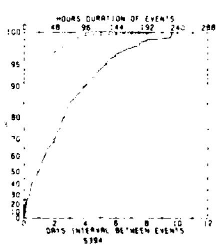
Nikolski



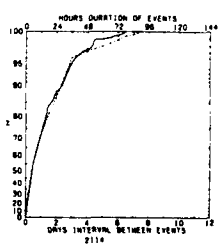
King Salmon



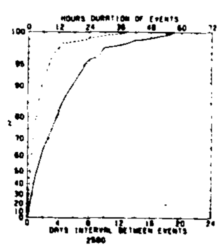
St. Paul



Port Moller

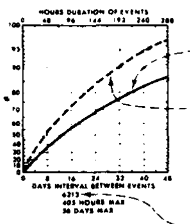


Driftwood Bay



Legend

Persistence of wind ≥20 kts.



Hours duration of events · Days interval between events

Cumulative percent frequency of hours duration equal to or less than the number of hours intersected by the solid curve.

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Cumulative percent frequency of days interval between events equal to or less than the number of days intersected by the broken curve.

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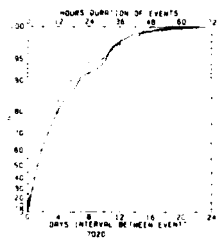
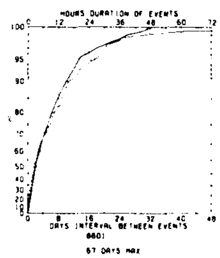
Number of observations

Top and bottom scales are variable to allow for variations in the data

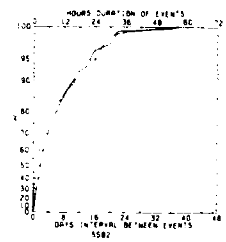
Adak



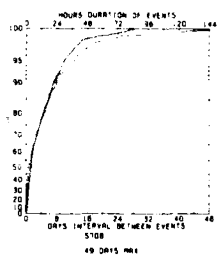
Nome



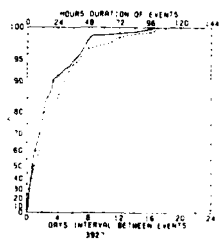
Moses Point



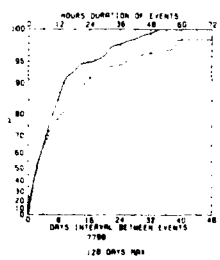
Unalakleet



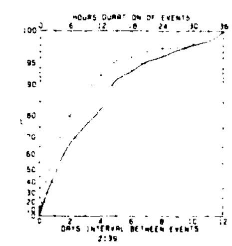
Cape Romanzof



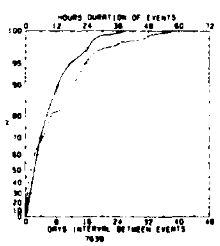
Bethel



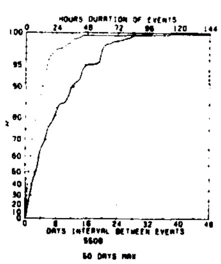
Nikolski



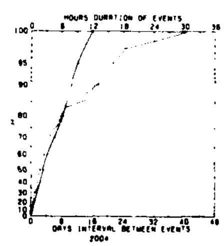
King Salmon



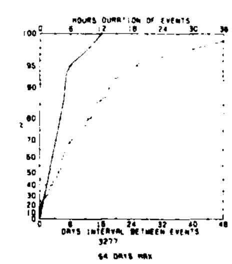
St. Paul



Port Moller



Driftwood Bay

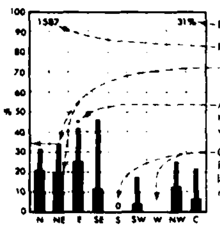


21 Persistence of wind ≥20 kts. **March**

Legend

Precipitation/wind direction

Percent frequency of surface wind observations from each direction and calm that were accompanied by precipitation, subdivided into liquid type (including freezing rain and freezing drizzle) and snow



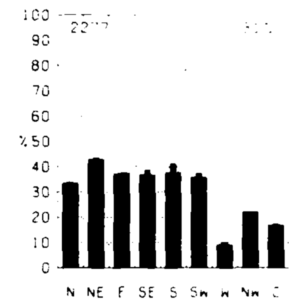
- Percentage of present weather observations reporting precipitation
- Number of observations
- (34% of all NE winds were accompanied by precipitation, of which 14% was liquid and 20% was snow
- An asterisk in the column for a given direction (or calm) indicates that the percentage was based on 10 30 observations of present weather and wind direction
- 0 replaces bar when no precipitation was observed with winds from a given direction (or calm). No bar graph is presented if less than 10 observations containing present weather were reported for a given direction (or calm)

Map - Precipitation

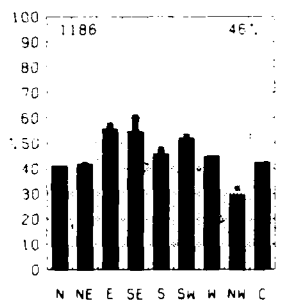
BLACK LINE Percent frequency of observations reporting precipitation

Of all the elements recorded in historical marine observations, precipitation is one of those most subject to interpretation error, from coding practices, observers preference for certain present weather codes, and other biases

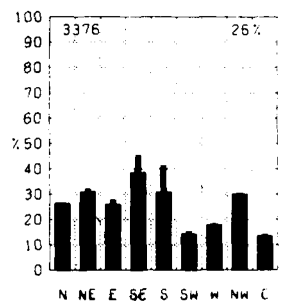
Buhta Provideniya



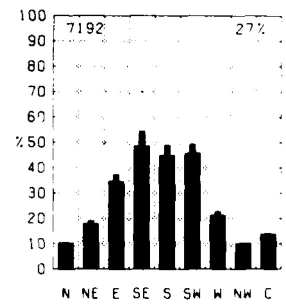
Gambell



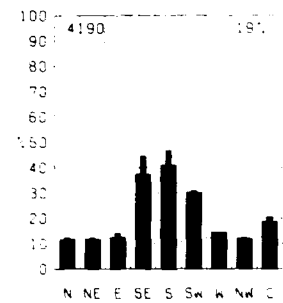
Northeast Cape



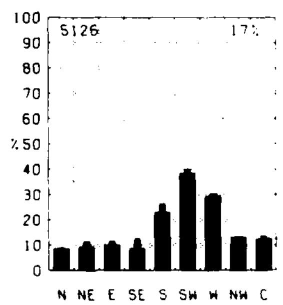
Nome



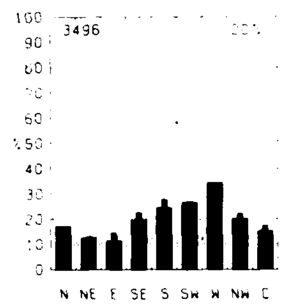
Moses Point



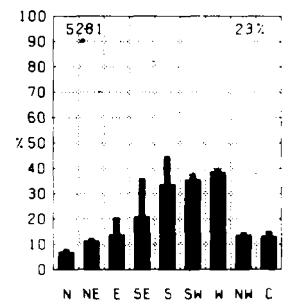
Unalakleet



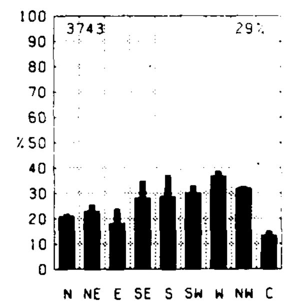
Cape Romanzof



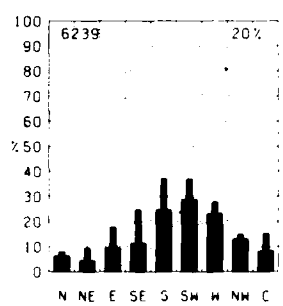
Bethel



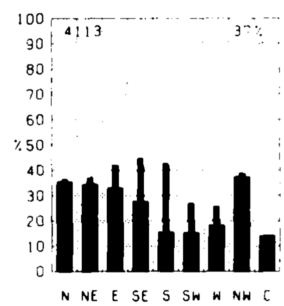
Cape Newenham



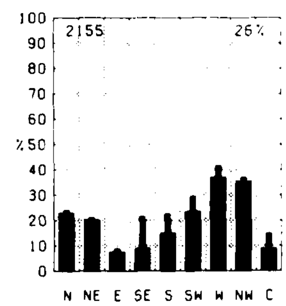
King Salmon



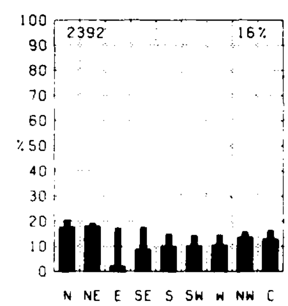
St. Paul

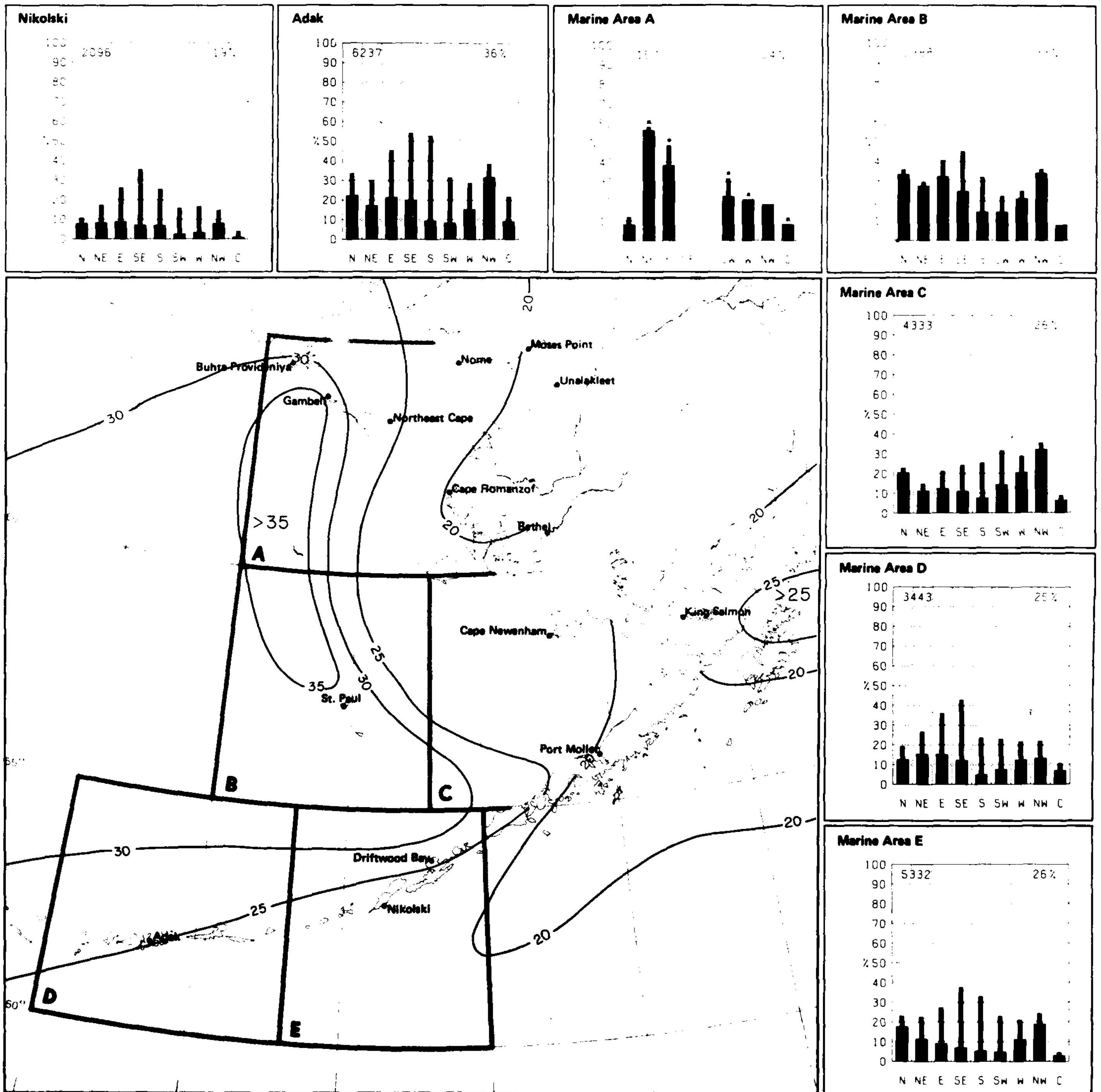


Port Moller



Driftwood Bay



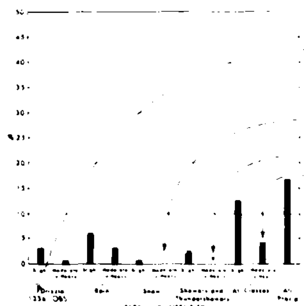


1 Precipitation

April

Legend

Precipitation types



Percent frequency of precipitation by type and intensity

Number of observations

Bars show percent frequency of observations reporting Precipitation of various types and intensities

0 indicates no observations in the category

• indicates < 05%, but > 0

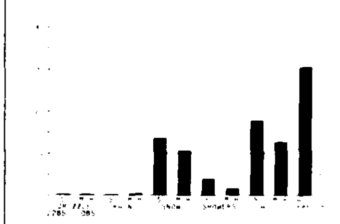
— — 4.0% of all observations recorded moderate to heavy precipitation

Map · Snow

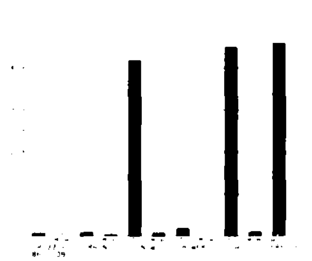
BLACK LINE Percent frequency of precipitation observations reporting snow

The percent frequency of observations reporting snow for a given point can be determined by multiplying the percent frequency of observations reporting precipitation (map 1) with that of precipitation observations reporting snow (map 2).

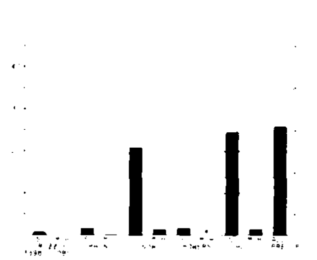
Buhta Provideniya



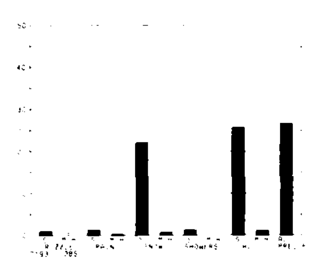
Gambell



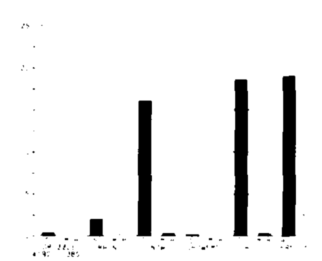
Northeast Cape



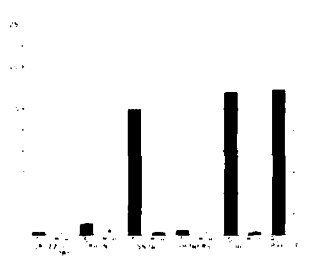
Nome



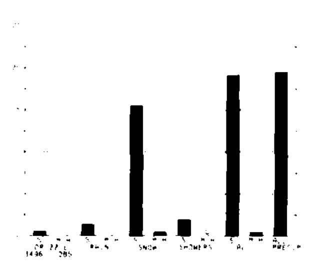
Moses Point



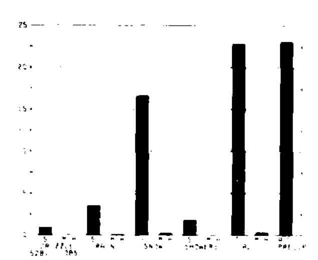
Unalakleet



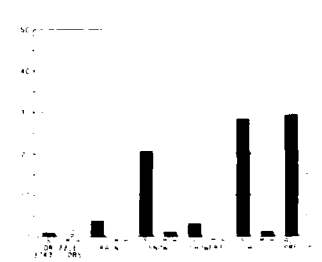
Cape Romanzof



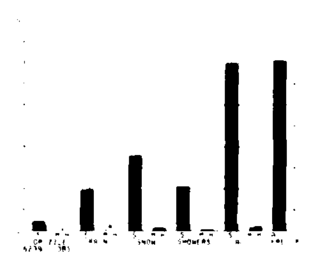
Bethel



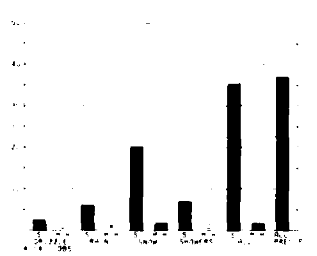
Cape Newenham



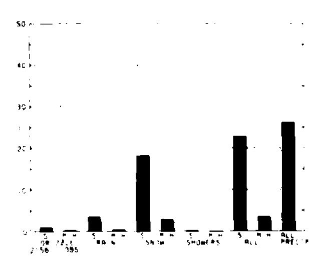
King Salmon



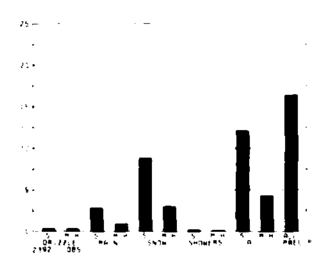
St. Paul

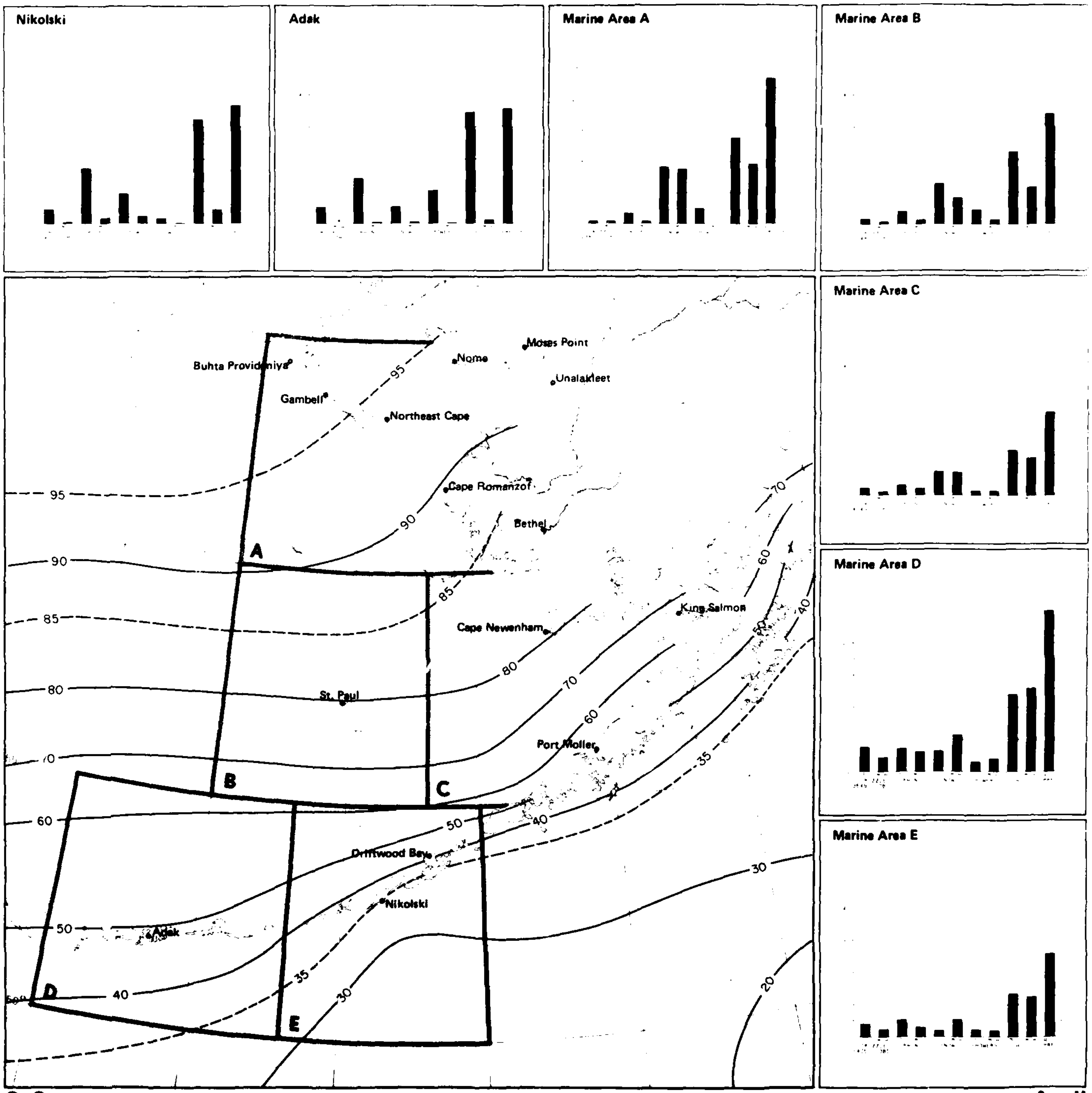


Port Moller



Driftwood Bay



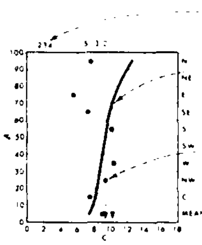

Nikolski
Adak
Marine Area A
Marine Area B
Marine Area C
Marine Area D
Marine Area E
Buhta Providéniya
Gambell
Nome
Moses Point
Unalakleet
Northeast Cape
Cape Romanzof
Bethel
Cape Newenham
King Salmon
St. Paul
Port Moller
Driftwood Bay
Nikolski
Adak
A
B
C
D
E
95
90
85
80
70
60
50
40
35
30
20

2 Snow

April

Legend

Air temperature/wind direction



- - - - Number of observations

Cumulative percent frequency of temperatures equal to or less than the temperature intersected by the curve

- - - 70% of all temperatures were ≤10.3 °C or ≤50.5 °F

S Standard deviation of temperatures °C

Mean temperature for each wind direction, calm and for all data combined are represented by dots

With NW winds, the mean temperature was 9.4 °C or 48.9 °F

Indicates that the mean temperature for a direction or calm was computed from 10-30 observations

The mean temperature is omitted when less than 10 observations for a direction or calm were available

Map - Air temperature mean and thresholds

BLACK LINE Percent frequency of temperature ≤0°C ≤32°F

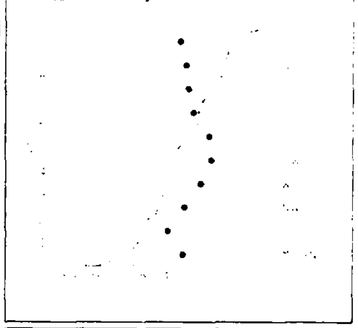
RED LINE Mean air temperature °C

BLUE LINE Percent frequency of wind chill temperature ≤ 30°C ≤ 22°F

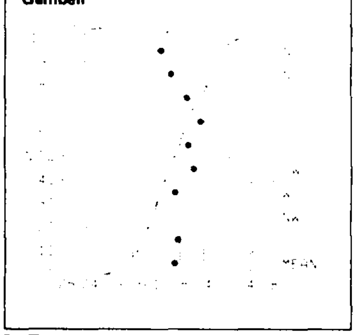
Air temperature readings recorded on transient ships in warm, sunny weather appear biased toward high temperatures, apparently because of improper instrument exposure and ventilation. Despite the inaccuracies, the large scale patterns and mean gradients of the isopleth analyses are relatively accurate.

The temperature scale of the graph may vary in both range and class interval. The percentage of temperature observations greater than a given value can be obtained by subtracting the cumulative percent frequency at that value from 100%. The number of observations and the standard deviation plus the plotted points on the graphs are based on those observations reporting both temperature and wind direction. The cumulative curve is based on all observations reporting temperature with or without wind direction.

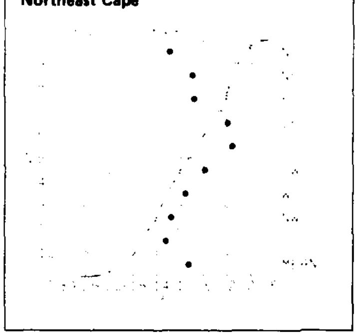
Bukhta Provideniya



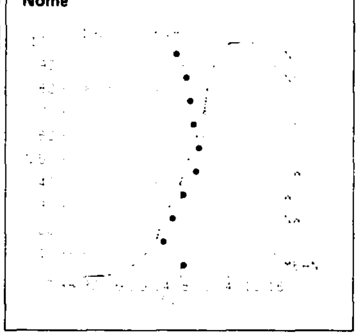
Gambell



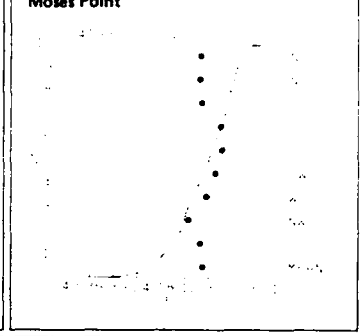
Northeast Cape



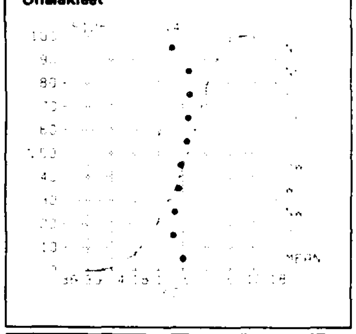
Nome



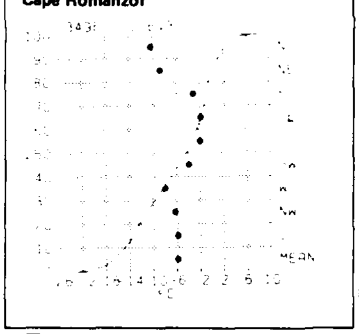
Moses Point



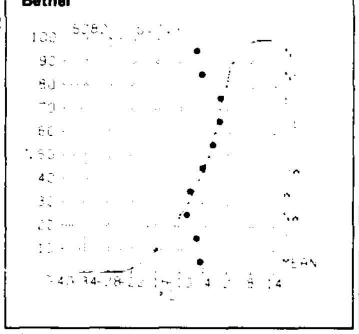
Unalakleet



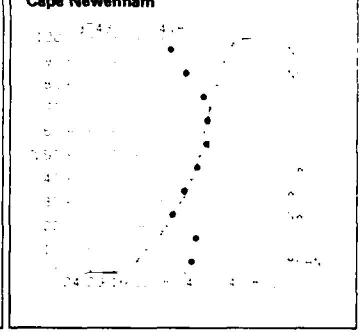
Cape Romanzof



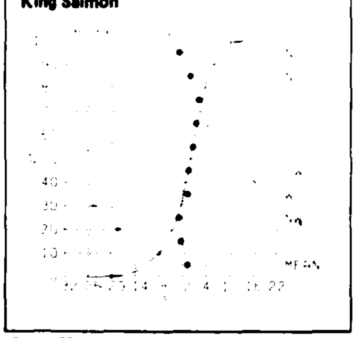
Bethel



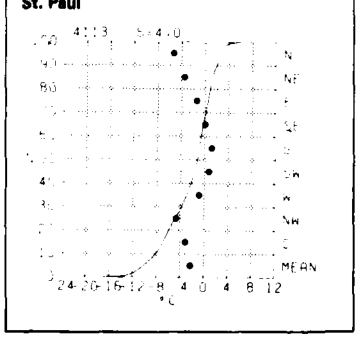
Cape Newenham



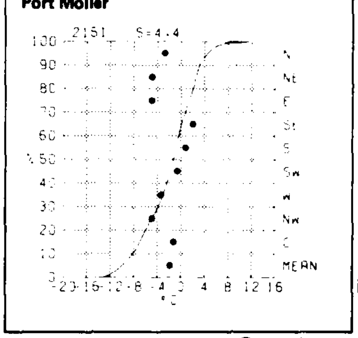
King Salmon



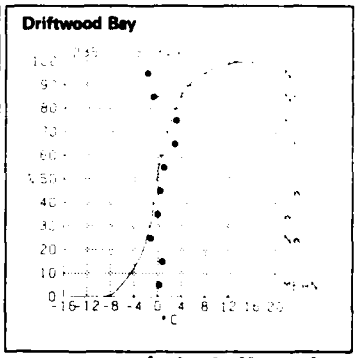
St. Paul

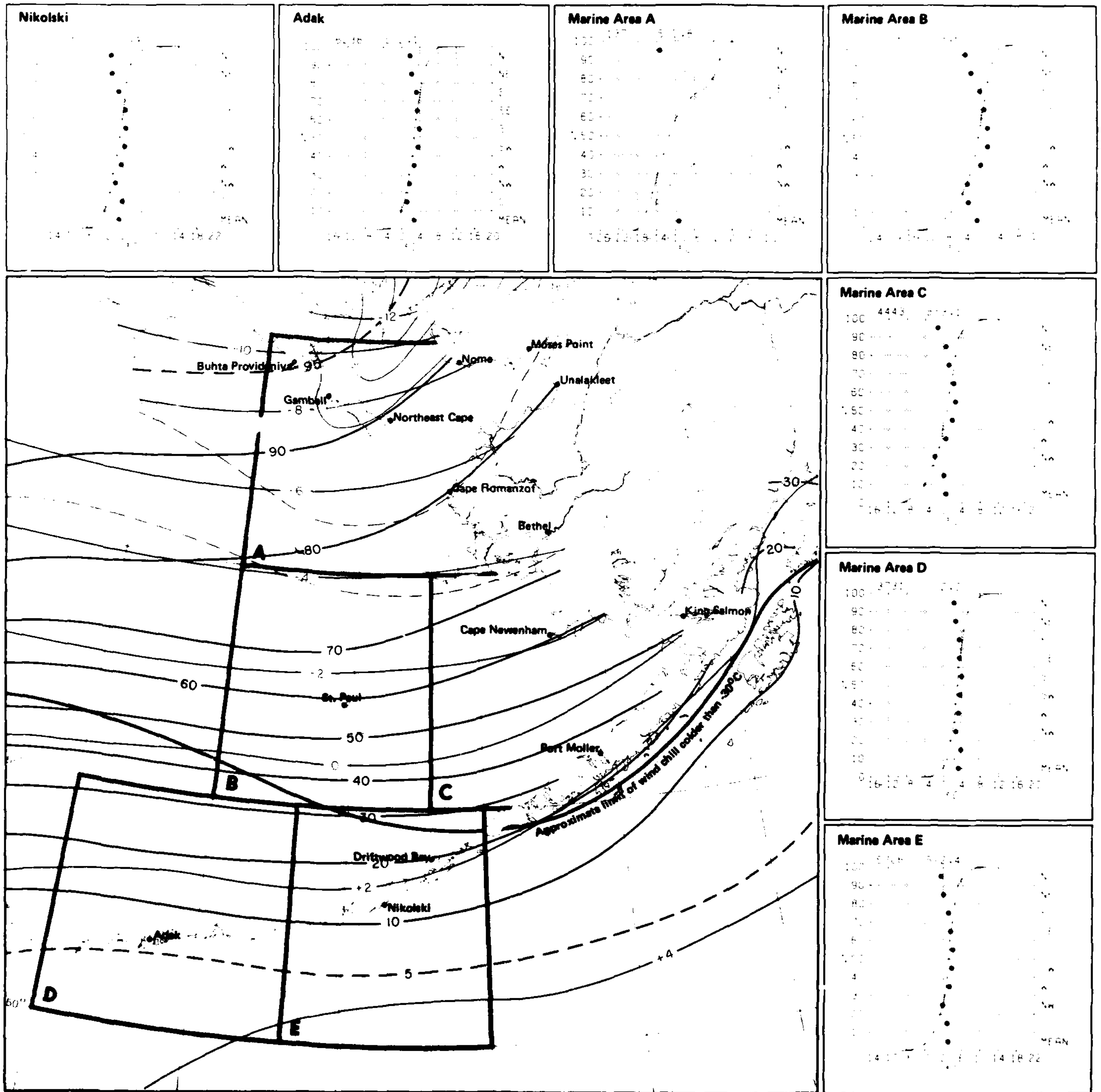


Port Moller



Driftwood Bay



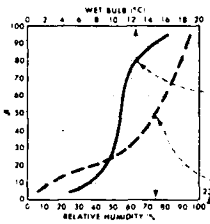


3 Air temperature mean and thresholds

April

Legend

Wet bulb/relative humidity



Cumulative percent frequency of wet bulb temperatures equal to or less than the temperature intersected by the curve (top scale)

Wet bulb °C

80% of all observed wet bulb temperatures were ≤12.5°C or 54.5°F

Cumulative percent frequency of relative humidities equal to or less than the humidity intersected by the curve (bottom scale)

Relative humidity %

50% of all observed relative humidities were ≤74%

Number of observations

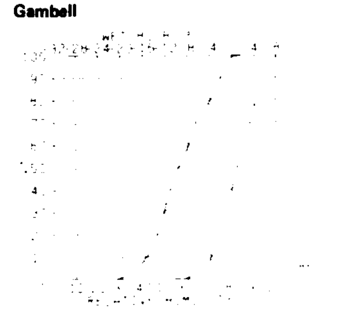
Map - Mean dew point temperature

BLACK LINE Mean dew point temperature (°C)

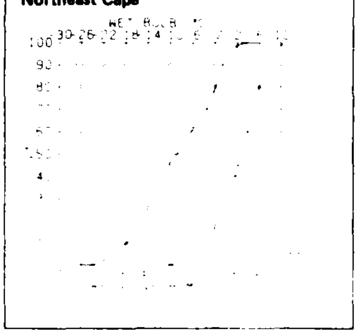
The observation count of the graph reflects those observations reporting both air and wet bulb temperatures; both are required in computing the relative humidity. The percentage of observations of either element greater than a given value can be obtained by subtracting the cumulative percent frequency of that value from 100%.

Buhta Provideniya

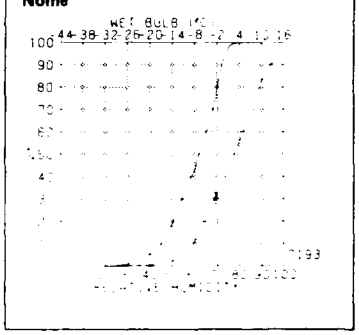
Gambell



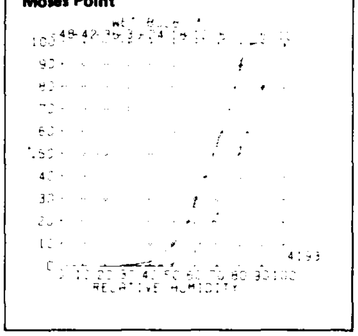
Northeast Cape



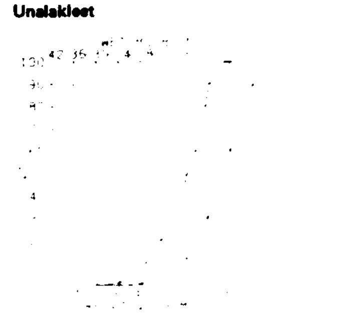
Nome



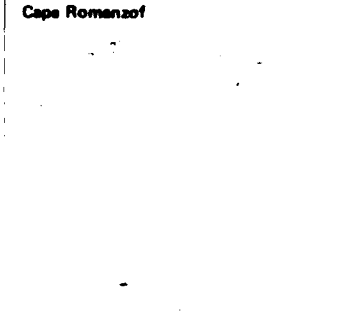
Moses Point



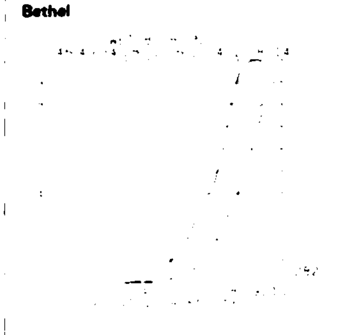
Unalakleet



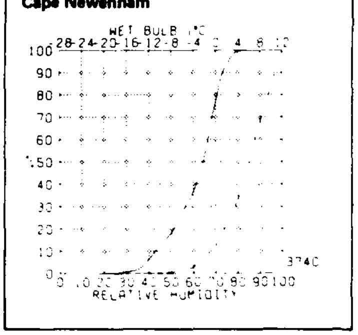
Cape Romanzof



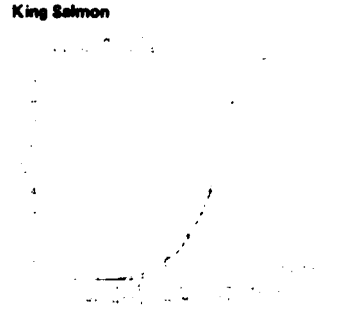
Bethel



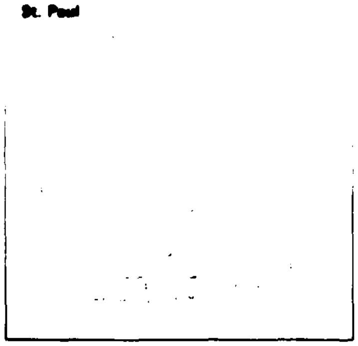
Cape Newenham



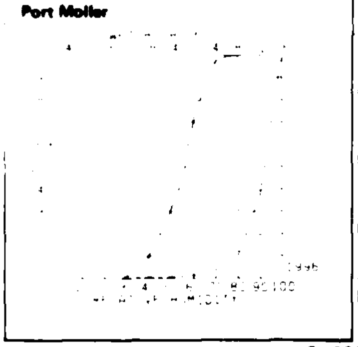
King Salmon



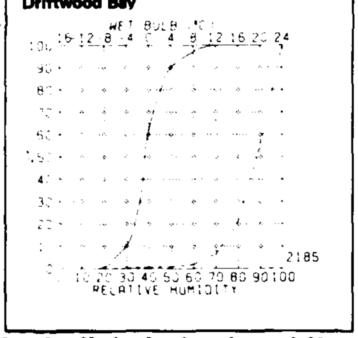
St. Paul

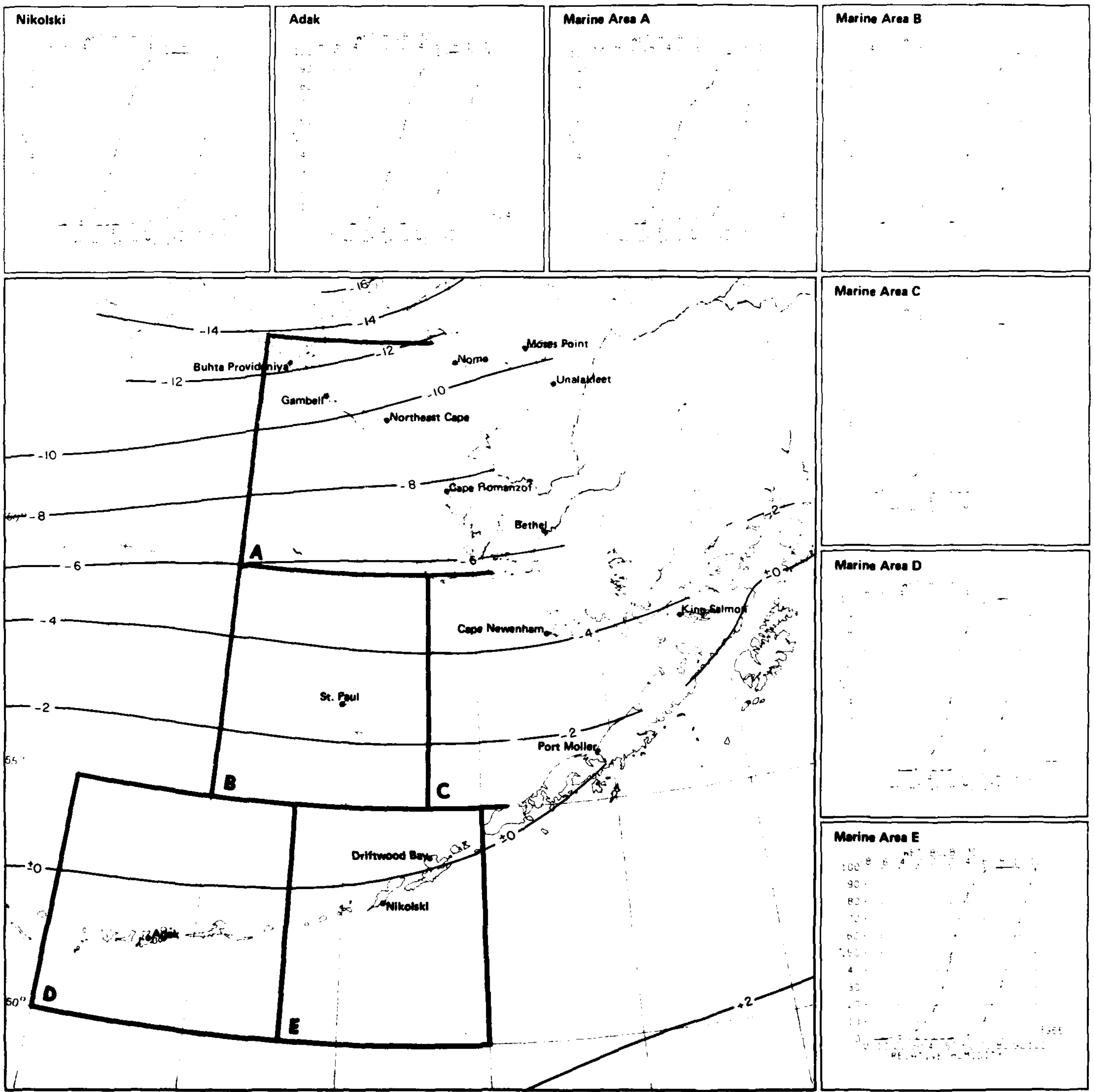


Port Moller



Driftwood Bay



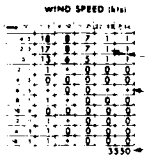


4 Mean dew point temperature

April

Legend

Air temperature/wind speed



Percent frequency of simultaneous occurrence of specified temperature (°C) and wind speed (knots)

1% of all observations reported temperature 2-3°C simultaneously with wind speed of 22-33 kts.)

+ Indicates < 5% but >0

Number of observations

Map - Air temperature extremes (°C)

BLACK LINE Maximum (99%) air temperature (1% of temperatures were greater than the given value)

BLUE LINE Minimum (1%) air temperature (1% of temperatures were equal to or less than the given value)

The graph can be used to determine the extent of human discomfort from the combined effects of extreme heat or cold and winds or to estimate the likelihood of superstructure icing. Icing potential increases as the air temperature drops below freezing and the winds increase above 10 knots (12 mph) and may become quite severe with temperatures equal to or less than -9°C (16°F) and winds equal to or greater than 34 knots (39 mph)

Buhta Provideniya

Gambell

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	4	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	4	[illegible]	[illegible]
[illegible]	[illegible]	4	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	4	4	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	4	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible]186

Northeast Cape

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
[illegible]	+	0	+	+	0
[illegible]	+	+	+	+	0
[illegible]	+	1	+	+	0
[illegible]	1	3	4	2	+
[illegible]	1	3	6	2	+
[illegible]	1	3	4	1	+
[illegible]	1	2	3	1	+
[illegible]	2	3	3	+	+
[illegible]	1	2	3	+	+
[illegible]	2	4	3	+	0
[illegible]	11	12	8	1	+

3321

Nome

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
10.11	0	+	0	0	0
8.9	+	+	0	0	0
6.7	+	+	+	0	0
4.5	+	+	+	0	0
2.3	+	1	2	+	0
0.1	1	3	5	1	+
-2.-1	2	5	7	1	+
-4.-3	2	5	5	1	+
-6.-5	2	3	3	1	+
-8.-7	2	4	3	1	+
≤-9	13	16	8	1	+

7192

Moses Point

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
6.7	+	+	+	[illegible]	[illegible]
4.5	+	+	+	+	[illegible]
2.3	1	3	[illegible]	+	[illegible]
0.1	1	3	[illegible]	1	+
-2.-1	1	4	[illegible]	1	+
-4.-3	2	4	5	1	[illegible]
-6.-5	1	[illegible]	4	1	+
-8.-7	1	3	[illegible]	1	+
-10.-9	1	[illegible]	4	1	[illegible]
-12.-11	[illegible]	3	4	1	[illegible]
≤-13	4	11	8	1	+

4193

Unalakleet

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
[illegible]	+	+	+	+	[illegible]
[illegible]	+	+	+	[illegible]	[illegible]
[illegible]	+	+	+	[illegible]	[illegible]
[illegible]	+	+	+	+	[illegible]
[illegible]	+	1	1	+	[illegible]
[illegible]	+	1	2	+	[illegible]
[illegible]	1	4	5	1	0
[illegible]	1	4	4	1	+
[illegible]	[illegible]	5	5	1	+
[illegible]	2	[illegible]	4	1	0
≤-5	9	25	14	2	+

5126

Cape Romanzof

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
6.7	+	+	+	0	0
4.5	+	+	1	+	0
2.3	2	2	2	1	0
0.1	1	3	6	2	+
-2.-1	2	5	8	3	+
-4.-3	2	4	5	2	+
-6.-5	1	1	3	1	+
-8.-7	1	2	3	1	+
-10.-9	1	1	3	1	+
-12.-11	1	2	3	2	+
≤-13	3	5	7	3	+

3496

Bethel

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
14.15	0	+	0	0	0
12.13	+	+	+	0	0
10.11	0	+	+	0	0
8.9	+	1	+	0	0
6.7	+	2	1	0	0
4.5	+	2	2	+	0
2.3	1	6	4	+	0
0.1	1	6	6	1	+
-2.-1	1	7	5	1	0
-4.-3	1	5	4	+	0
≤-5	3	19	18	1	0

5282

Cape Newenham

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
6.7	+	+	+	+	+
4.5	1	1	1	+	+
2.3	3	5	5	2	0
0.1	3	7	7	2	+
-2.-1	4	7	7	1	+
-4.-3	3	4	5	1	+
-6.-5	1	2	3	+	0
-8.-7	1	2	4	1	0
-10.-9	1	2	2	+	0
-12.-11	1	2	3	+	0
≤-13	+	2	2	+	0

3743

King Salmon

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
16.17	0	+	+	0	0
14.15	+	+	+	0	0
12.13	0	+	+	0	0
10.11	+	+	+	+	0
8.9	+	1	1	+	0
6.7	+	3	3	1	+
4.5	1	4	3	1	+
2.3	2	9	7	1	+
0.1	2	9	5	+	0
-2.-1	2	9	4	+	0
≤-3	5	17	8	1	0

6239

St. Paul

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
4.5	0	+	1	+	+
2.3	+	3	8	3	+
0.1	+	6	14	4	+
-2.-1	1	6	11	4	+
-4.-3	1	3	6	3	+
-6.-5	+	2	4	2	+
-8.-7	+	2	3	3	+
-10.-9	+	1	2	1	+
-12.-11	+	1	2	1	+
-14.-13	+	+	+	+	0
≤-15	0	+	+	+	0

4113

Port Moller

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
12.13	+	0	0	0	0
10.11	0	+	+	0	0
8.9	0	+	+	0	0
6.7	+	1	1	+	0
4.5	1	2	2	1	+
2.3	4	7	5	1	+
0.1	4	7	5	1	0
-2.-1	4	9	5	1	+
-4.-3	3	6	4	+	0
-6.-5	1	3	3	+	0
≤-7	2	8	7	+	0

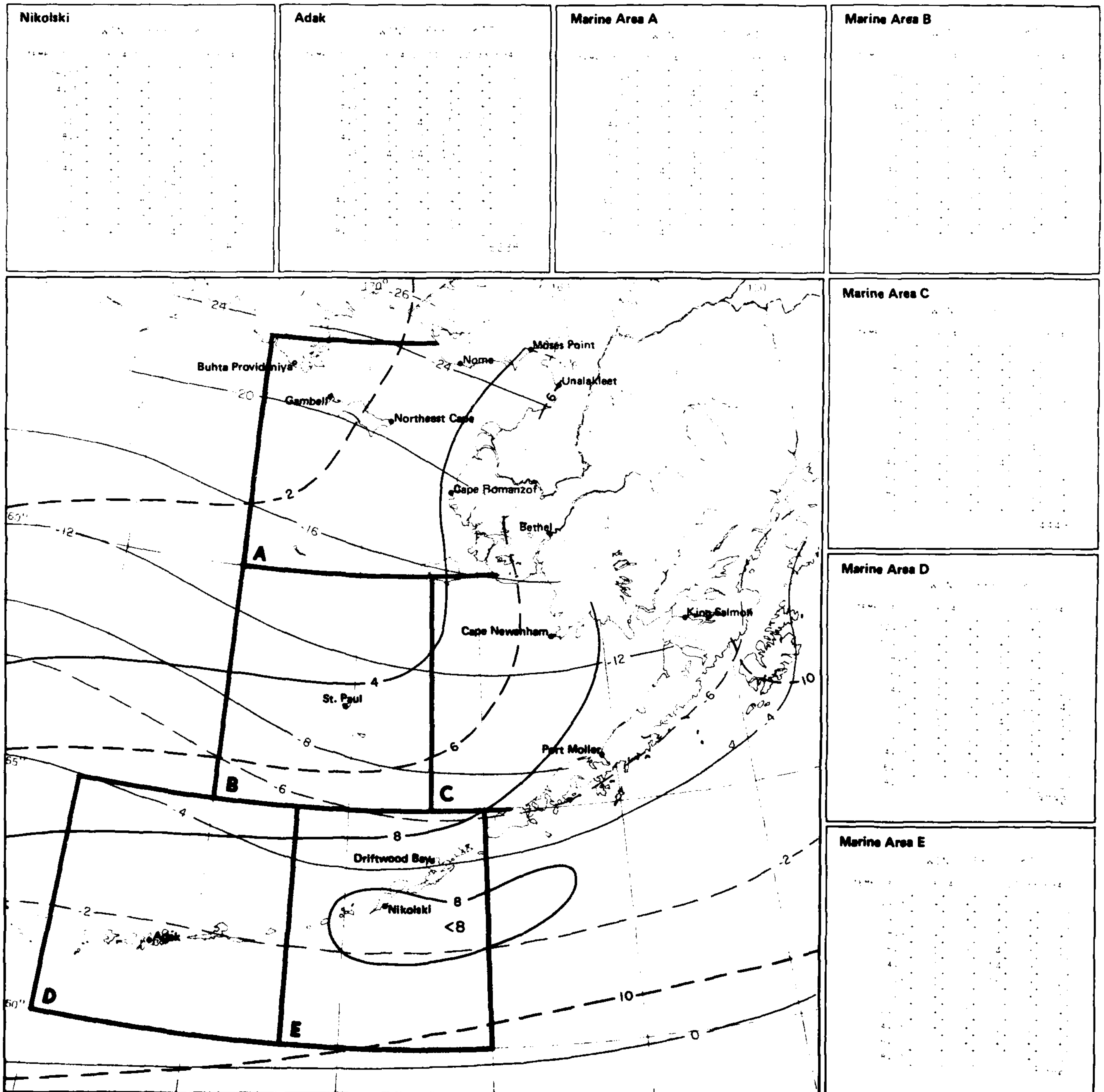
2151

Driftwood Bay

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
16.17	0	0	+	0	0
14.15	0	+	+	0	0
12.13	0	1	1	+	0
10.11	+	1	1	+	0
8.9	+	1	1	+	+
6.7	1	1	2	+	0
4.5	1	3	2	+	0
2.3	4	8	4	+	0
0.1	5	13	5	1	0
-2.-1	4	14	6	+	0
≤-3	2	10	7	+	0

2357

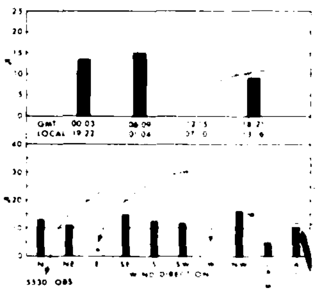


5 Air temperature extremes (°C)

April

Legend

Fog/time and fog/wind direction



Number of observations

Bar graphs represent percent frequency of "Fog without precipitation" for various hour groupings and wind directions. Data are based on 100% for each hour group and direction category.

• indicates < 05% but > 0

0 indicates no fog occurred with the wind direction

Data show that 17% of all NW winds were accompanied by "Fog without precipitation"

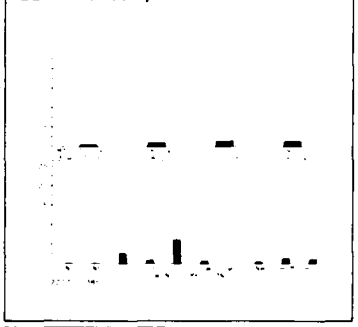
Map - Fog

BLACK LINE · Percent frequency of occurrence of all fog

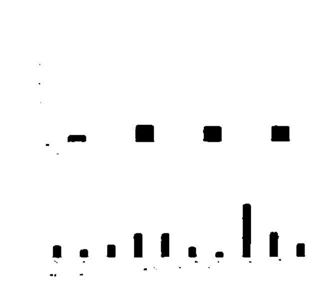
BLUE LINE · Percent frequency of fog occurring without precipitation

The percent frequency of observations reporting fog with precipitation for a given point can be determined by computing the difference between the two analyses

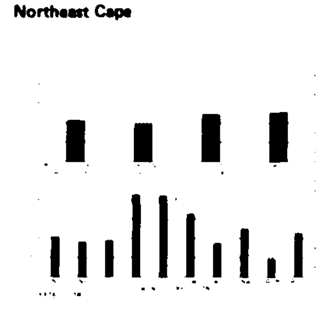
Buhta Provideniya



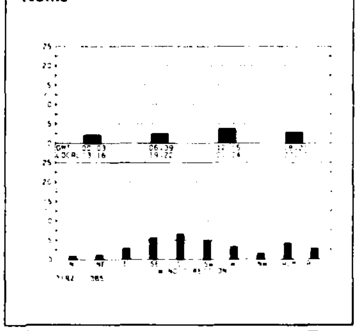
Gambell



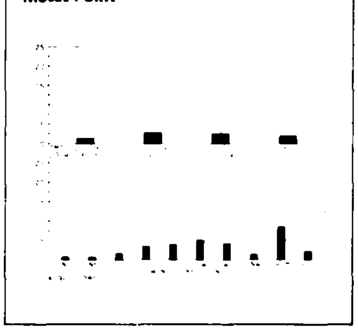
Northeast Cape



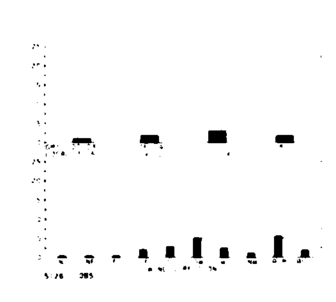
Nome



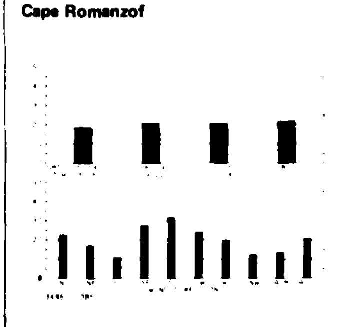
Moses Point



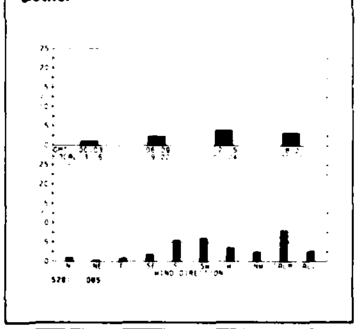
Unalakleet



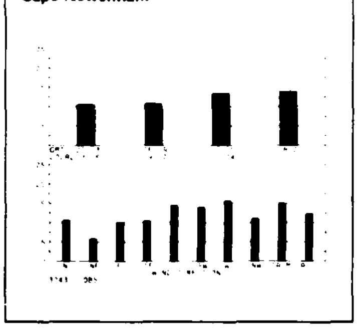
Cape Romanzof



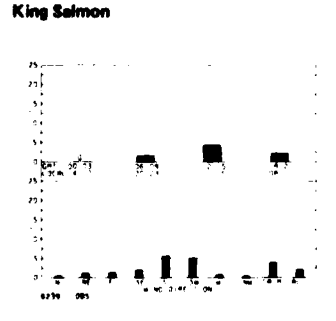
Bethel



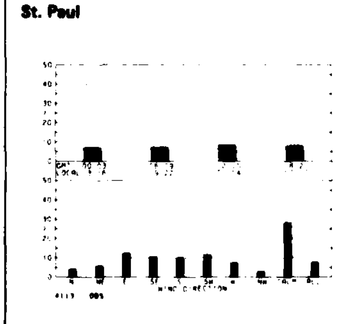
Cape Newenham



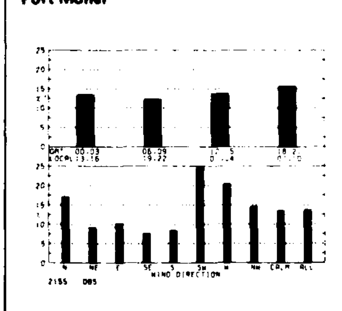
King Salmon



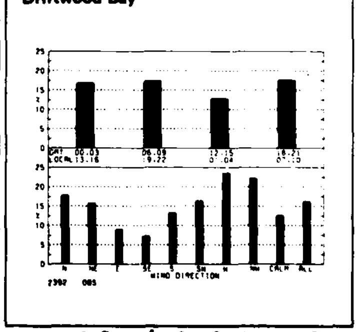
St. Paul



Port Moller



Driftwood Bay



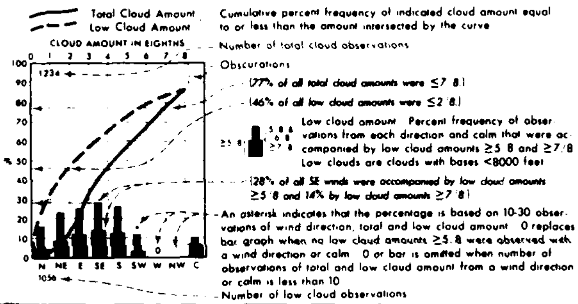

Nikolski
Adak
Marine Area A
Marine Area B
Marine Area C
Marine Area D
Marine Area E
Buhta Providniya
Gambell
Nome
Moses Point
Unalakleet
Northeast Cape
Cape Romanzof
Bethel
Cape Newenham
King Salmon
St. Paul
Port Moller
Driftwood Bay
Nikolski
Adak
>10
>20
A
B
C
D
E

6 Fog

April

Legend

Cloud cover/wind direction



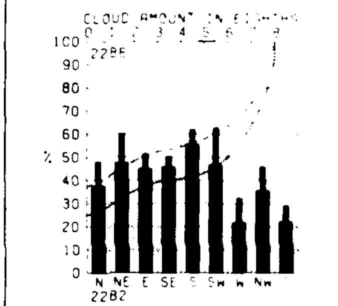
Map · Cloud amount thresholds

BLACK LINE Percent frequency of total cloud amount ≤2/8

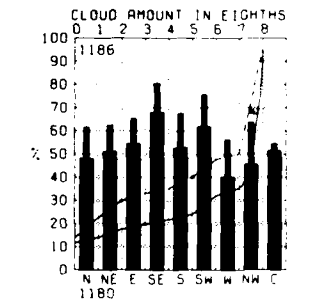
BLUE LINE Percent frequency of low cloud amount ≥5/8

Since the number of observations reporting low cloud amount is usually less than that for total cloud amount, somewhat different samples may be used to compute the two curves on the graph. This may lead to inconsistencies where low cloud amount appears higher than the total cloud amount. Where this occurred the graph was adjusted in favor of the total cloud by making the curves coincide. The frequency of obscured conditions may be determined by subtracting the cumulative percent frequency corresponding to 8/8 coverage from 100%. In computing the bar graph, obscurations are considered as 8/8 coverage.

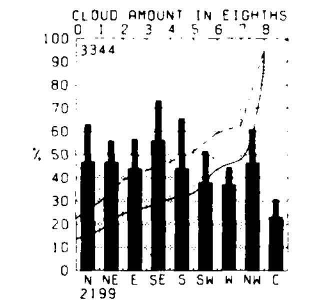
Buhta Provideniya



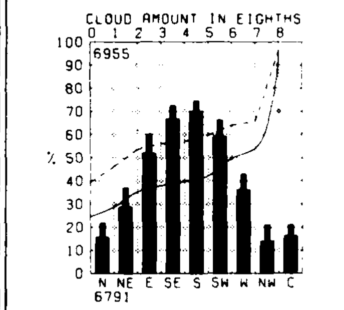
Gambell



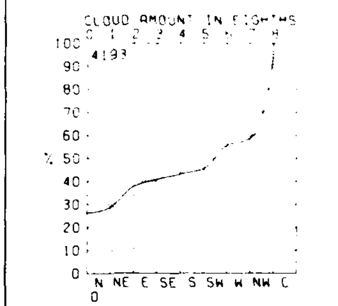
Northeast Cape



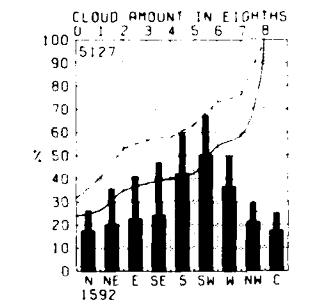
Nome



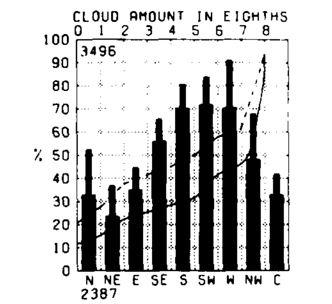
Moses Point



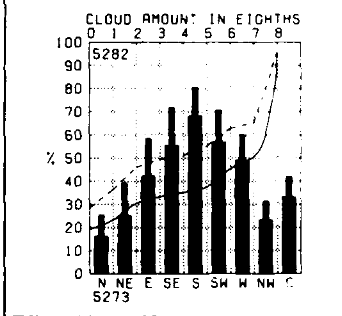
Unalakleet



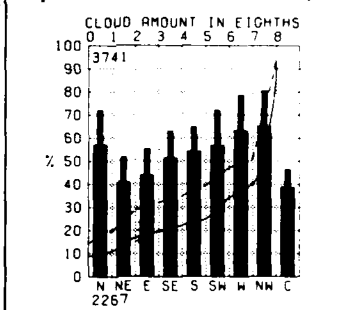
Cape Romanzof



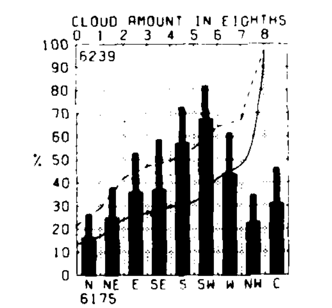
Bethel



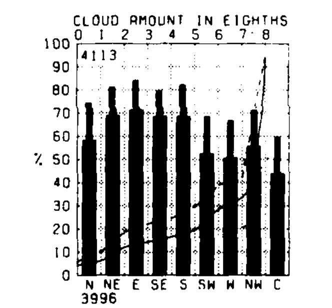
Cape Newenham



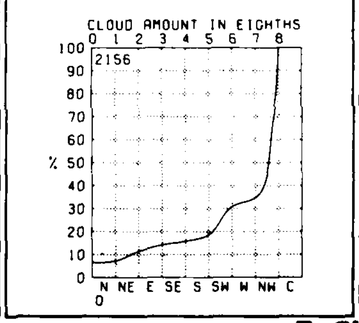
King Salmon



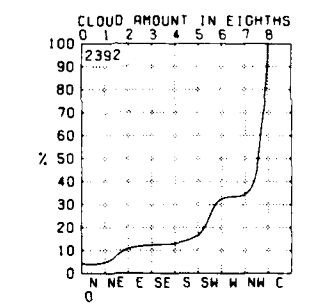
St. Paul

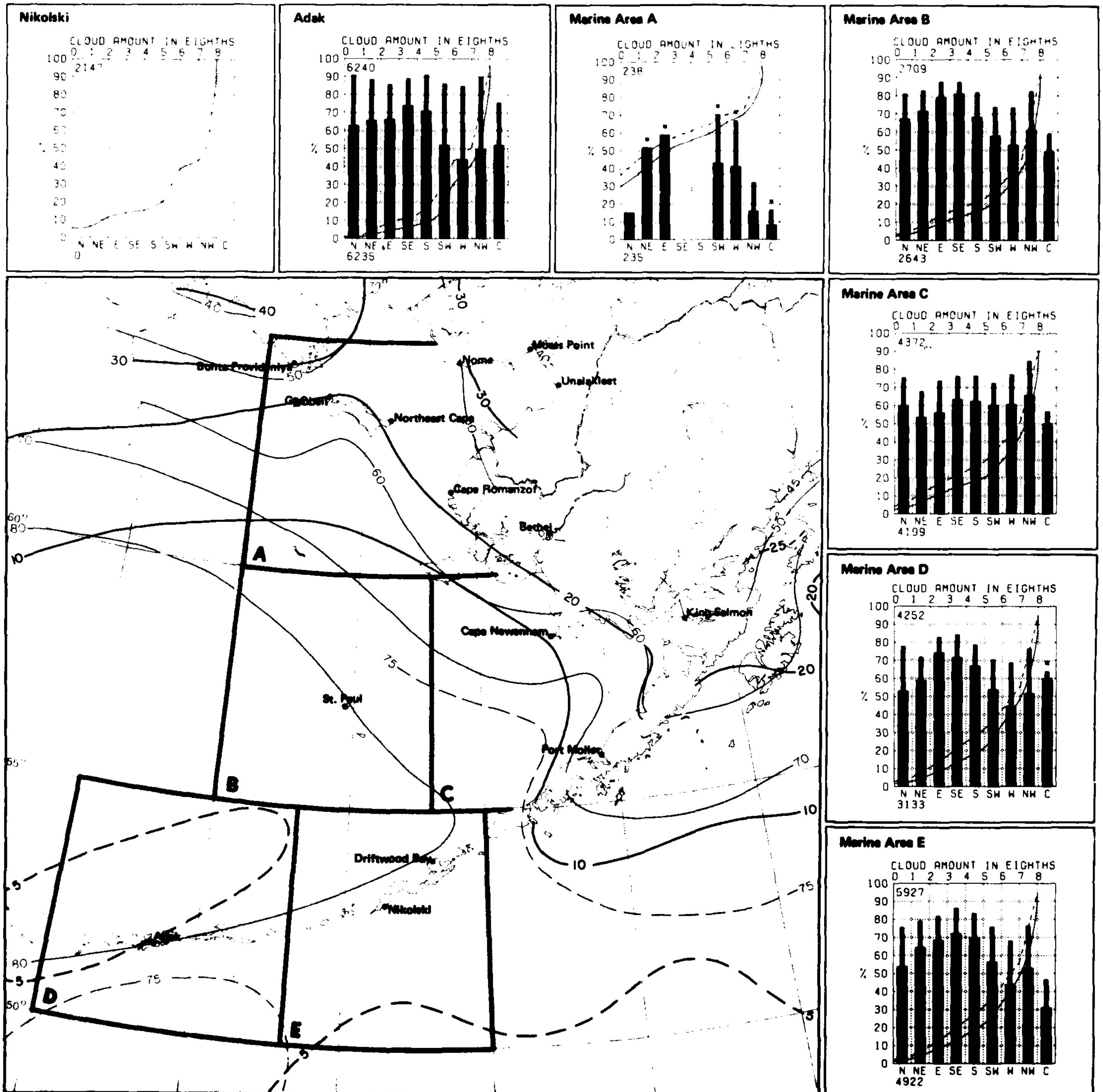


Port Moller



Driftwood Bay

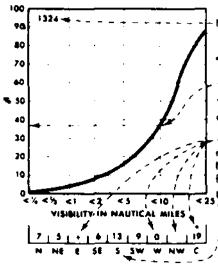




7 Cloud amount thresholds **April**

Legend

Visibility/wind direction



Number of observations

Cumulative percent frequency of visibilities less than the visibility intersected by the curve

(37% of all visibilities reported were <10 nautical miles.)

The table below the graph indicates percent frequency of occurrence of visibility <2 nautical miles versus wind direction

+ indicates < 5% but >0 0 indicates that no visibilities <2 nautical miles were observed with winds from a direction or calm. No percentage is given if less than 10 observations were available for visibility and wind direction. An asterisk indicates that the percentage was based on 10-30 observations of visibility and wind direction

(13% of all S winds were accompanied by visibilities <2 nautical miles.)

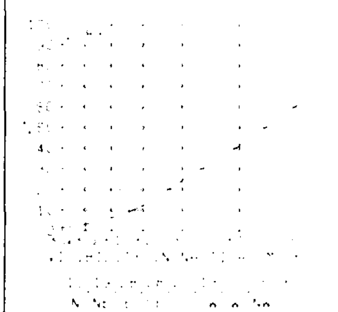
Map - Visibility thresholds

BLACK LINE Percent frequency of visibilities ≥5 nautical miles

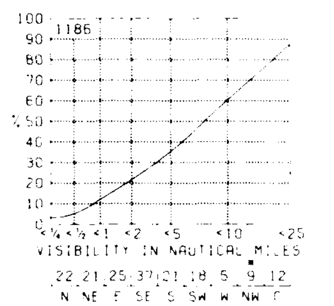
BLUE LINE Percent frequency of visibilities <2 nautical miles

The percentage of visibility equal to or greater than a given value can be obtained from the graph by subtracting the cumulative percent frequency of that value from 100%. Visibility at sea is difficult to measure because of the lack of reference points. Also, some observers seem to report reduced visibilities at night because of darkness, though this tendency has abated in recent years. The coarseness of the coding intervals, however, tends to minimize serious biases in the summarized data. Visibilities greater than 25 nmi should be interpreted cautiously because the earth's curvature makes it impossible to see 25 nmi horizontally from the bridges of most ships

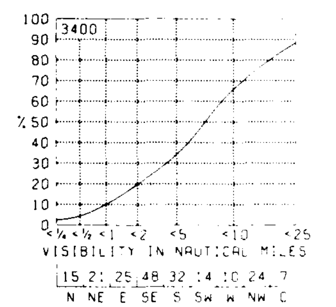
Buhta Provideniya



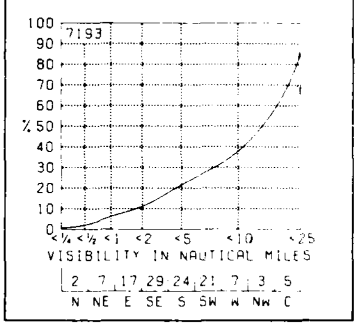
Gambell



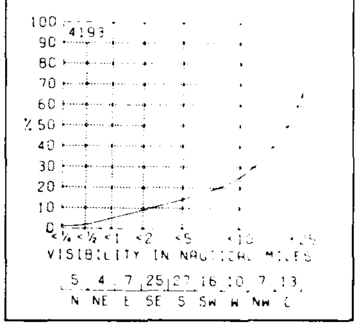
Northeast Cape



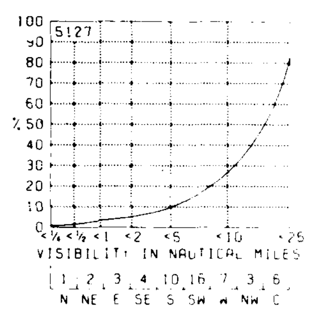
Nome



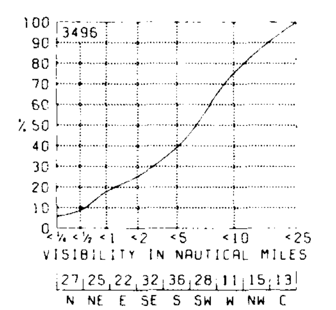
Moses Point



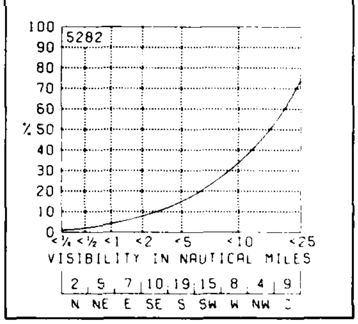
Unalakleet



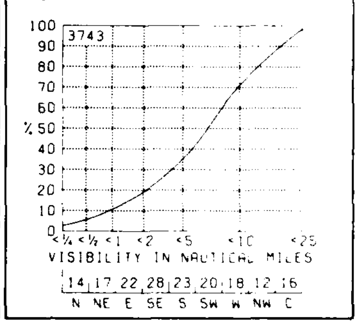
Cape Romanzof



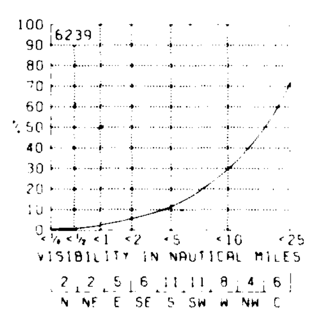
Bethel



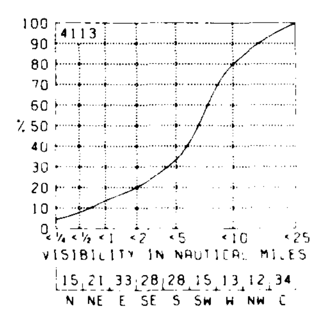
Cape Newenham



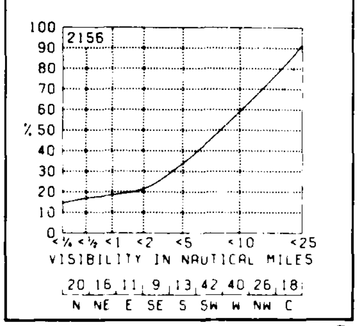
King Salmon



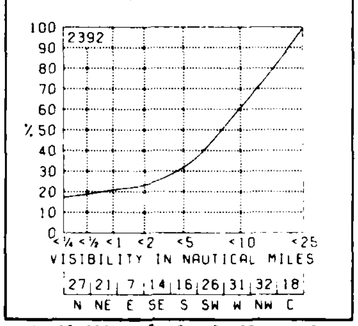
St. Paul

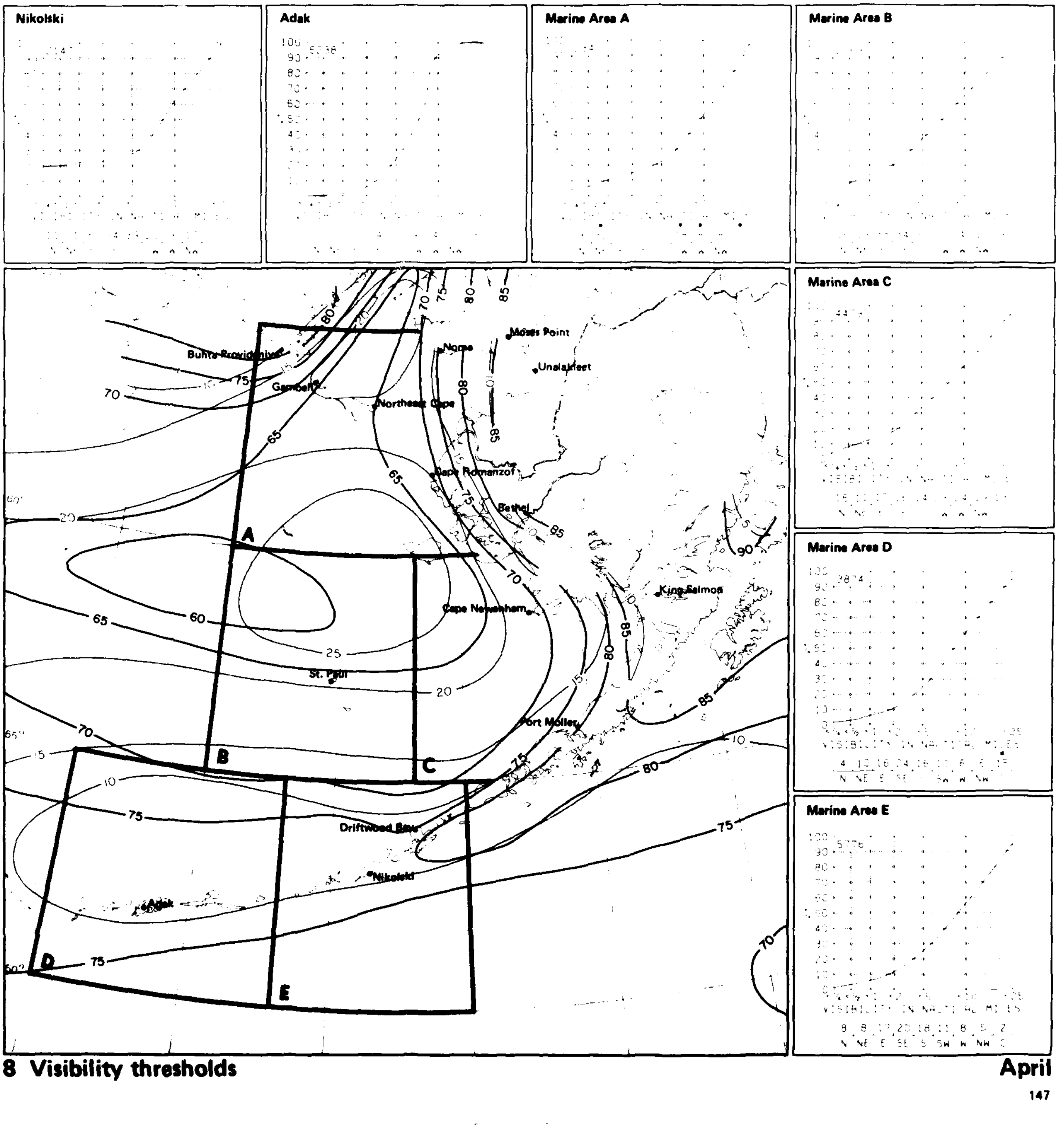


Port Moller



Driftwood Bay



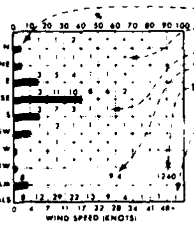


8 Visibility thresholds **April**

Legend

Wind speed/direction

Direction frequency (top scale) Bars represent percent frequency of winds observed from each direction. Speed frequency (bottom scale) Printed figures represent percent frequency of wind speeds observed from each direction



(4% of all winds were from the N)
• indicates < 5% but >0
(1% of all winds were from the S with a speed 22-27 knots)
The scalar mean speed was 9.4 knots
Number of observations
(1% of winds from all directions had wind speed ≥48 knots)

WIND SPEED INTERVAL (KNOTS)

0-3	4-6	7-10	11-16	17-21	22-27	28-33	34-40	41-47	≥48

0 4 7 11 17 22 28 34 41 48+
Printed scale on bottom of chart

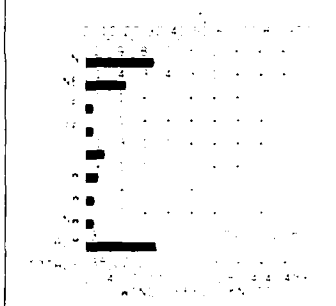
Map - Wind speed thresholds

BLACK LINE - Percent frequency of wind speed ≤10 knots (≤12 mph)

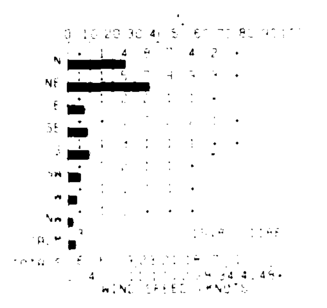
BLUE LINE - Percent frequency of wind speed ≥34 knots (≥39 mph)

The scalar mean wind speed on the graph is based on the number of observations reporting a wind speed with direction. The sum of the totals line provides the cumulative percent frequency of wind speed below a selected threshold value. In the example graph, 71% of all winds were less than 17 knots (20 mph).

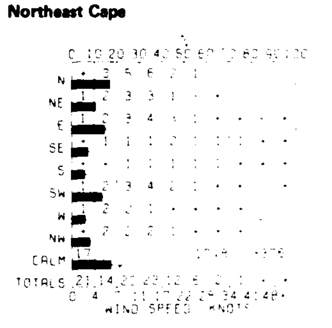
Buhta Provideniya



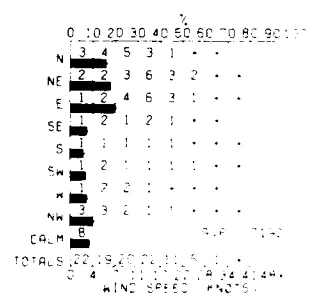
Gambell



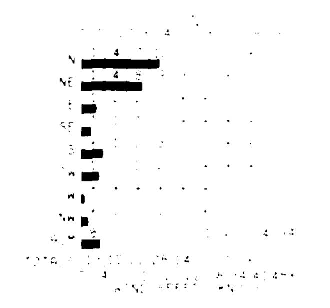
Northeast Cape



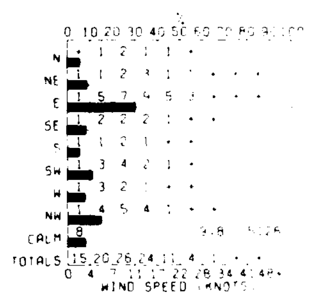
Nome



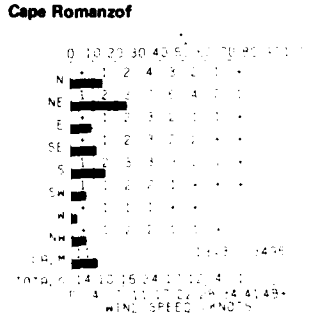
Moses Point



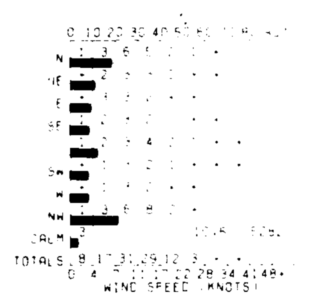
Unalakleet



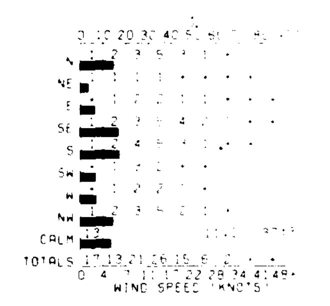
Cape Romanzof



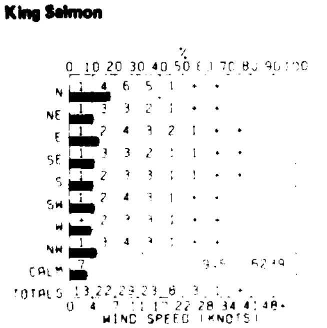
Bethel



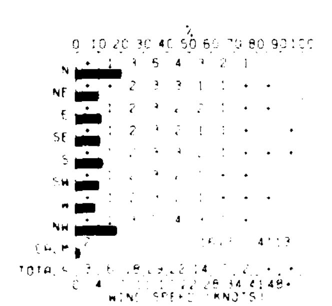
Cape Newenham



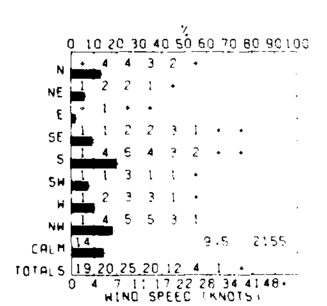
King Salmon



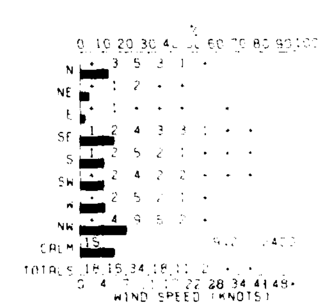
St. Paul

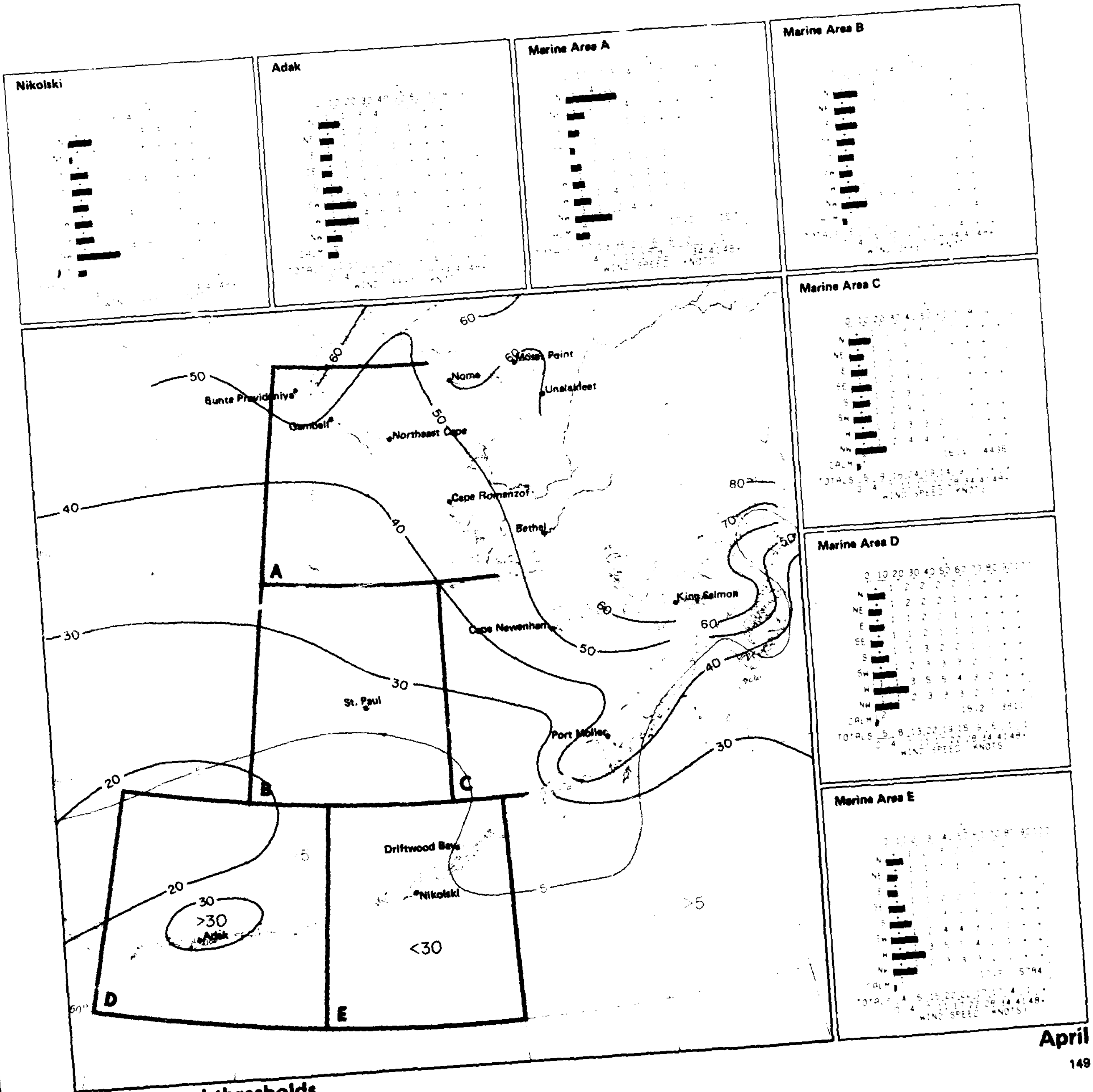


Port Moller



Driftwood Bay

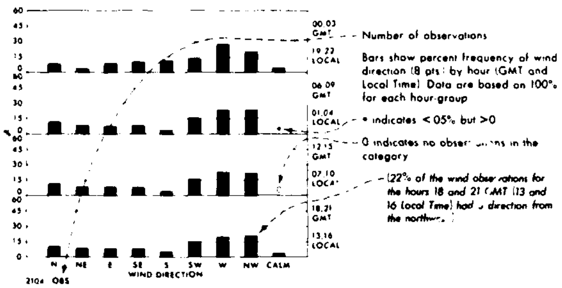




9 Wind speed thresholds

April

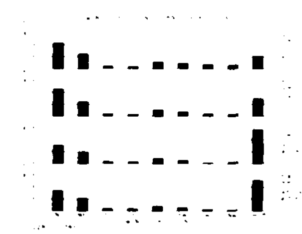
Legend **Wind direction/diurnal variation**



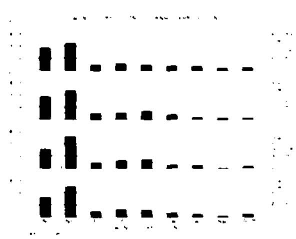
Map - Vector mean wind

10.2 Direction of flow toward station dot, vector magnitude in knots
example: vector mean wind is from northeast at 10.2 knots or 11.7 mph.

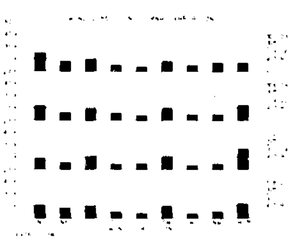
Buhta Provideniya



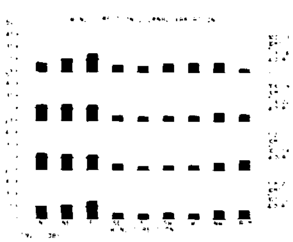
Gambell



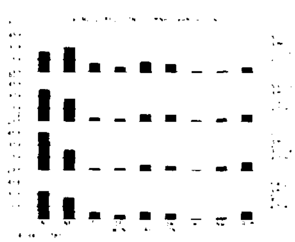
Northeast Cape



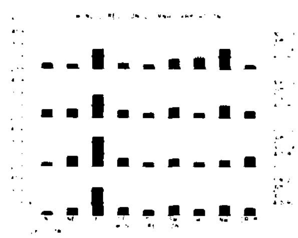
Nome



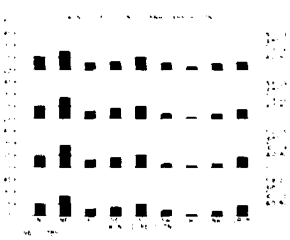
Moses Point



Unalakleet

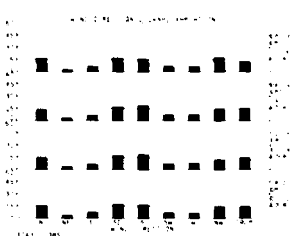


Cape Romanzof

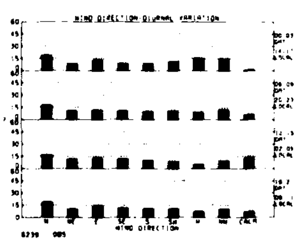


Bethel

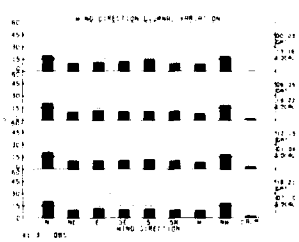
Cape Newenham



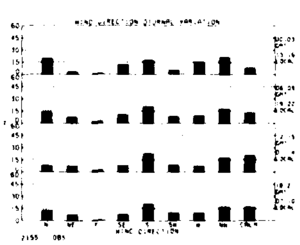
King Salmon



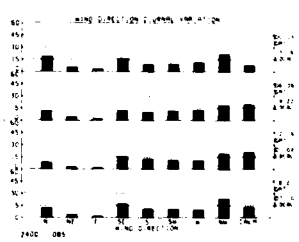
St. Paul

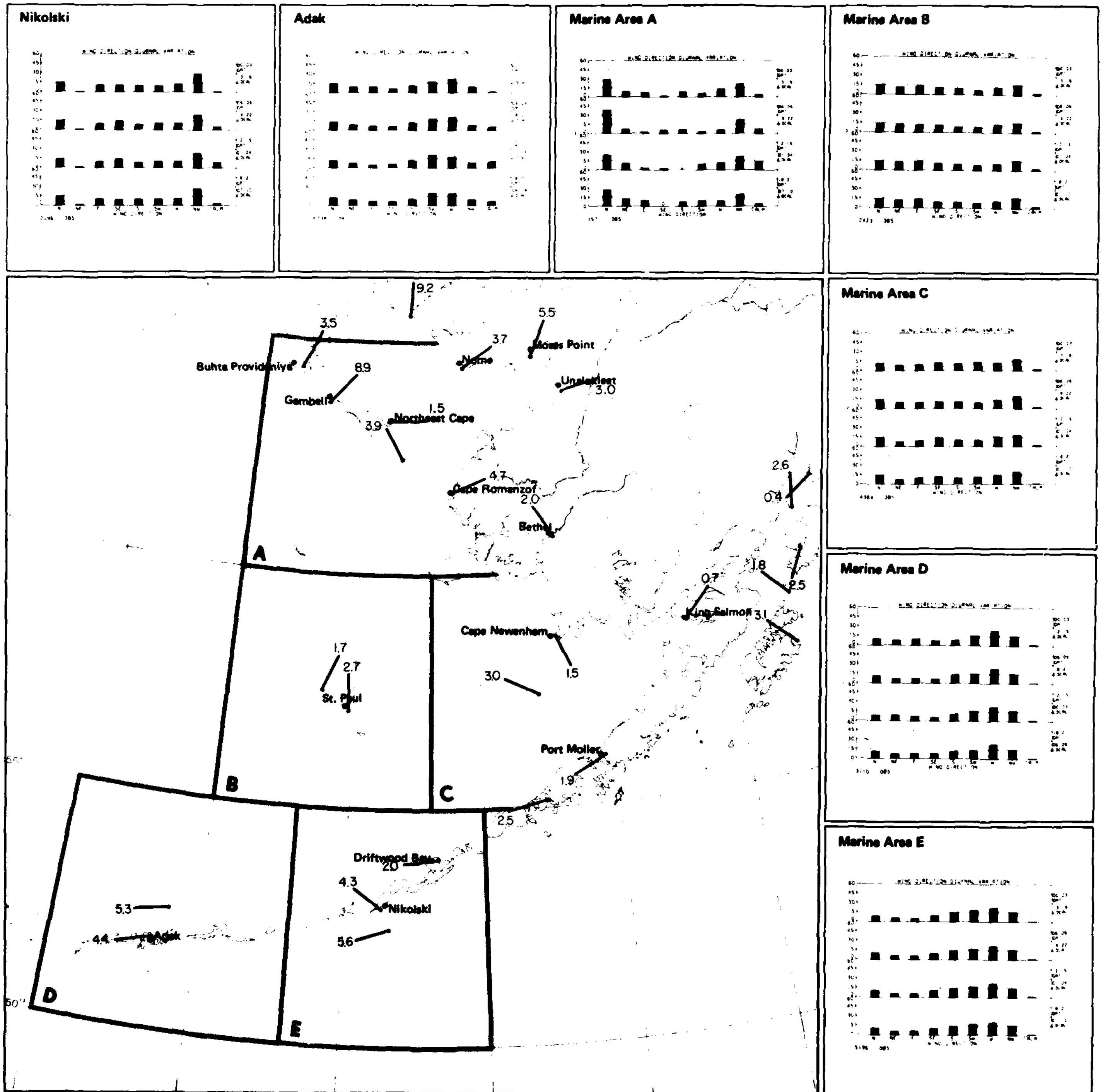


Port Moller



Driftwood Bay



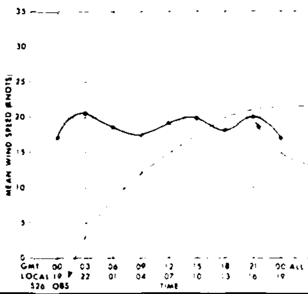


10 Vector mean wind

April

Legend

Wind speed/diurnal variation

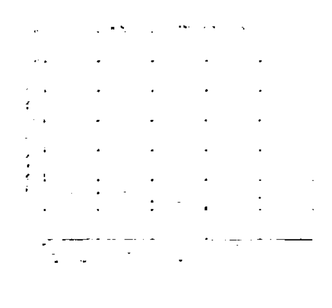


Map - Scalar mean wind

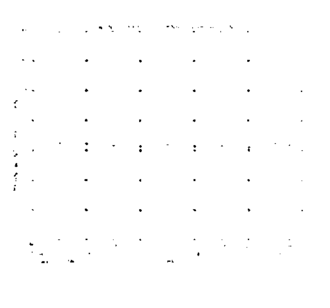
BLACK LINE Scalar mean wind knots

In areas of high persistence of direction the magnitude of the vector mean winds should closely approach that of the scalar mean winds. As most of the marine observations are recorded at six hour intervals disregard the plots for other than 00 06 12 18 GMT hours on the marine area graphs

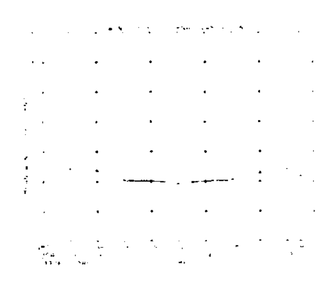
Buhta Provideniya



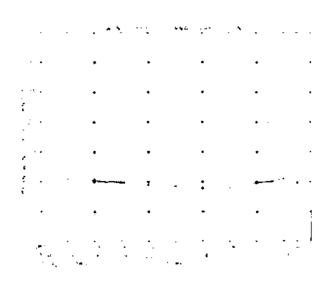
Gambell



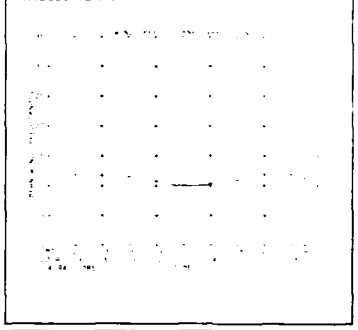
Northeast Cape



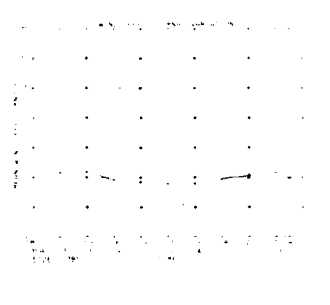
Nome



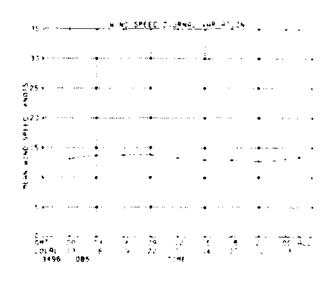
Moses Point



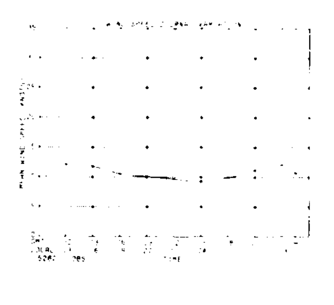
Unalakleet



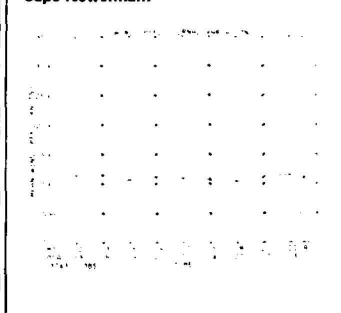
Cape Romanzof



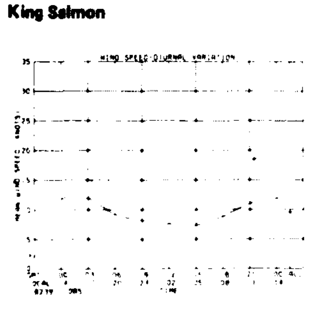
Bethel



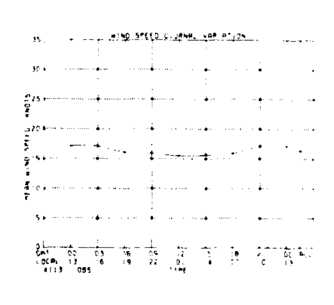
Cape Newenham



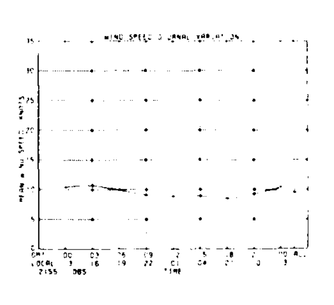
King Salmon



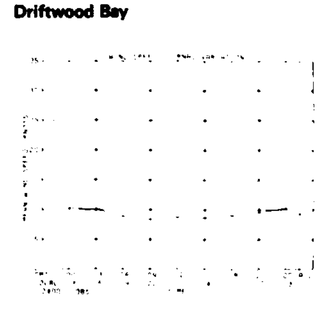
St. Paul



Port Moller

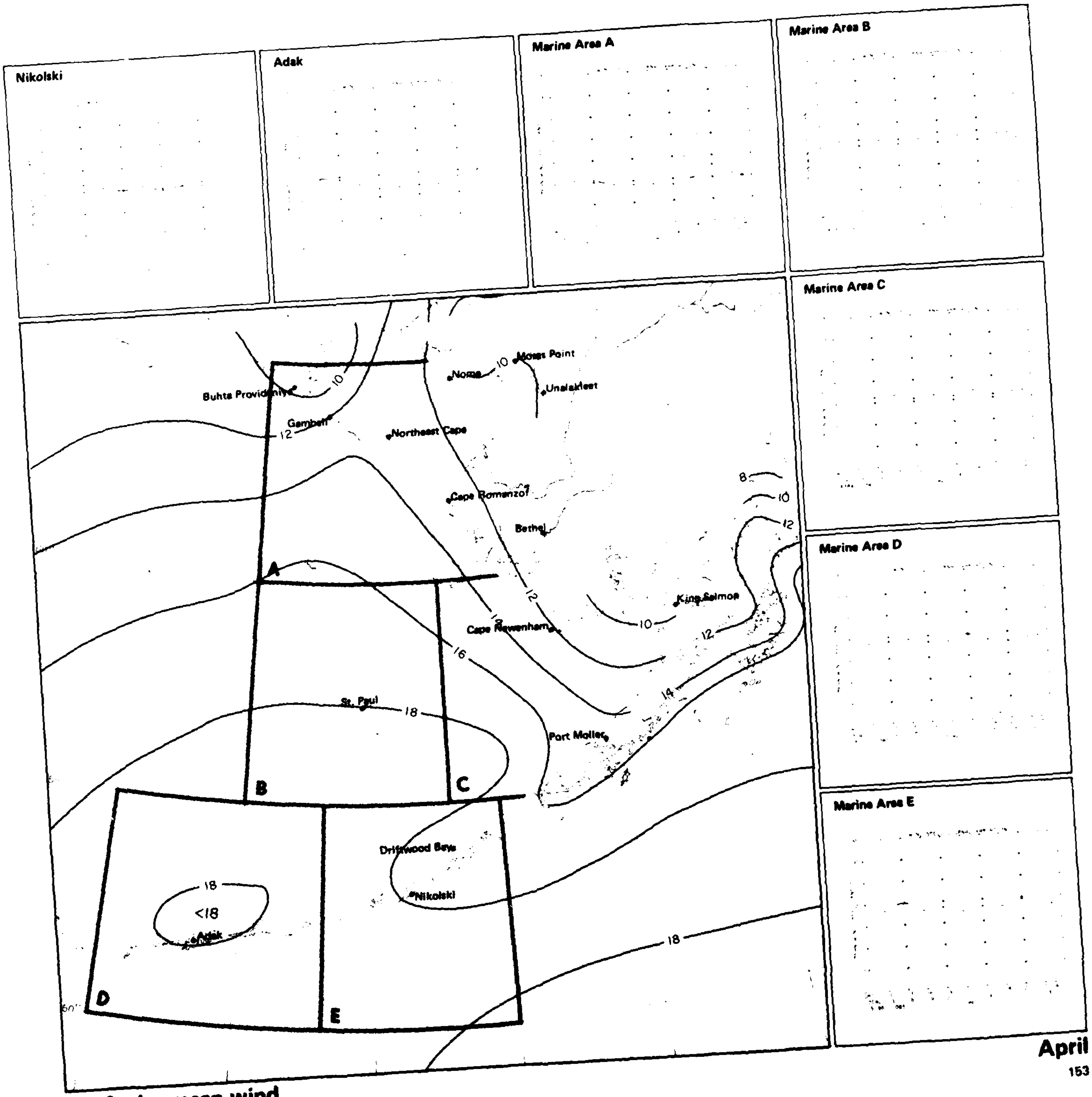


Driftwood Bay



April

11 Wind speed/diurnal variation



11 Scalar mean wind

April

Legend — Low cloud ceiling/visibility

VISIBILITY

LOW CLOUD CEILING	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	0	0	•	3	13	64
50<80	0	0	0	0	•	1
35<50	0	•	0	0	0	4
20<35	0	•	1	1	2	2
10<20	0	•	1	1	2	1
6<10	0	1	0	•	•	0
3<6	•	•	0	•	•	0
1.5<3	•	0	0	0	0	0
0<1.5	•	0	0	0	0	0

334

Percent frequency of simultaneous occurrence of specified low cloud ceilings (hundreds of feet) and visibilities (nautical miles)

Low cloud ceiling heights are estimated from the height of low clouds (h) when low cloud amount (N_h) is ≥5/8

Obscurations are included under ceiling 0<1.5

N.C. (no ceiling) includes bases of clouds ≥8000 feet as well as occurrences of N_h <5/8

2% of all observations reported ceiling ≥1000 but <2000 feet simultaneously with visibility ≥5 but <10 nautical miles

• indicates <.5% but >0

Number of observations

Map - Low cloud ceiling and visibility thresholds

BLACK LINE Percent frequency of low cloud ceiling ≥1000 feet (or no low cloud ceiling) and visibility ≥5 nautical miles

BLUE LINE Percent frequency of low cloud ceiling <600 feet and/or visibility <2 nautical miles

Buhta Providenya

Gambell

VISIBILITY

LOW CLOUD CEILING	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	•	•	1	1	7	29
50<80	•	0	•	•	1	1
35<50	0	0	0	•	1	1
20<35	•	•	1	1	4	2
10<20	•	2	3	5	9	5
6<10	1	7	4	5	3	1
3<6	•	1	1	1	1	•
1.5<3	•	0	0	•	0	0
0<1.5	3	2	•	0	0	0

1180

Northeast Cape

VISIBILITY

LOW CLOUD CEILING	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	•	1	1	2	12	33
50<80	0	0	0	0	0	•
35<50	0	•	0	•	•	•
20<35	•	•	•	1	3	1
10<20	•	1	3	5	10	5
6<10	1	1	2	2	4	1
3<6	•	•	1	1	1	•
1.5<3	0	0	•	0	•	0
0<1.5	3	2	2	•	•	0

2199

Nome

VISIBILITY

LOW CLOUD CEILING	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	•	•	•	1	6	53
50<80	0	•	•	•	1	2
35<50	•	0	•	•	1	2
20<35	•	•	•	2	3	3
10<20	•	•	1	3	4	2
6<10	•	1	1	3	2	•
3<6	•	1	1	1	•	•
1.5<3	0	•	•	•	•	0
0<1.5	1	2	1	•	0	0

6791

Moses Point

VISIBILITY

LOW CLOUD CEILING	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	0	0	0	•	[illegible]	[illegible]
50<80	0	0	[illegible]	[illegible]	[illegible]	[illegible]
35<50	0	0	[illegible]	[illegible]	[illegible]	[illegible]
20<35	0	0	[illegible]	[illegible]	[illegible]	[illegible]
10<20	0	0	0	4	1	1
6<10	0	0	0	[illegible]	[illegible]	[illegible]
3<6	0	0	0	[illegible]	0	0
1.5<3	0	0	0	0	0	0
0<1.5	•	2	1	•	0	0

238

Unalakleet

Cape Romanzof

VISIBILITY

LOW CLOUD CEILING	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	2	2	1	4	21	18
50<80	•	•	•	•	1	1
35<50	•	0	0	•	1	•
20<35	•	•	•	1	4	1
10<20	•	1	1	4	6	1
6<10	•	2	2	4	5	1
3<6	•	1	1	2	1	0
1.5<3	•	0	•	0	•	0
0<1.5	7	2	•	0	0	0

2387

Bethel

VISIBILITY

LOW CLOUD CEILING	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	•	•	•	1	6	49
50<80	•	•	•	•	•	3
35<50	0	0	•	•	1	4
20<35	0	•	•	1	3	5
10<20	•	•	1	2	5	4
6<10	•	•	1	2	3	2
3<6	•	•	1	1	2	•
1.5<3	0	•	0	•	•	•
0<1.5	2	1	1	•	0	0

5273

Cape Newenham

VISIBILITY

LOW CLOUD CEILING	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	•	•	•	1	15	19
50<80	0	0	•	0	•	•
35<50	•	0	0	0	•	•
20<35	0	•	•	1	3	2
10<20	0	•	•	4	9	5
6<10	•	1	2	6	8	3
3<6	•	•	1	2	2	1
1.5<3	0	0	•	•	•	0
0<1.5	5	3	2	1	0	0

2267

King Salmon

VISIBILITY

LOW CLOUD CEILING	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	•	•	•	•	5	48
50<80	0	0	0	•	1	3
35<50	•	•	•	•	1	4
20<35	•	•	•	1	4	8
10<20	•	•	1	2	5	5
6<10	•	•	1	1	2	1
3<6	•	•	•	1	1	•
1.5<3	•	•	•	•	•	•
0<1.5	1	1	1	•	•	0

6175

St. Paul

VISIBILITY

LOW CLOUD CEILING	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	•	•	•	1	15	10
50<80	0	0	0	•	1	•
35<50	0	0	0	•	1	1
20<35	•	•	•	1	7	4
10<20	2	1	2	5	17	5
6<10	•	1	1	3	4	1
3<6	•	2	2	3	2	•
1.5<3	•	•	•	•	•	•
0<1.5	5	1	•	•	•	0

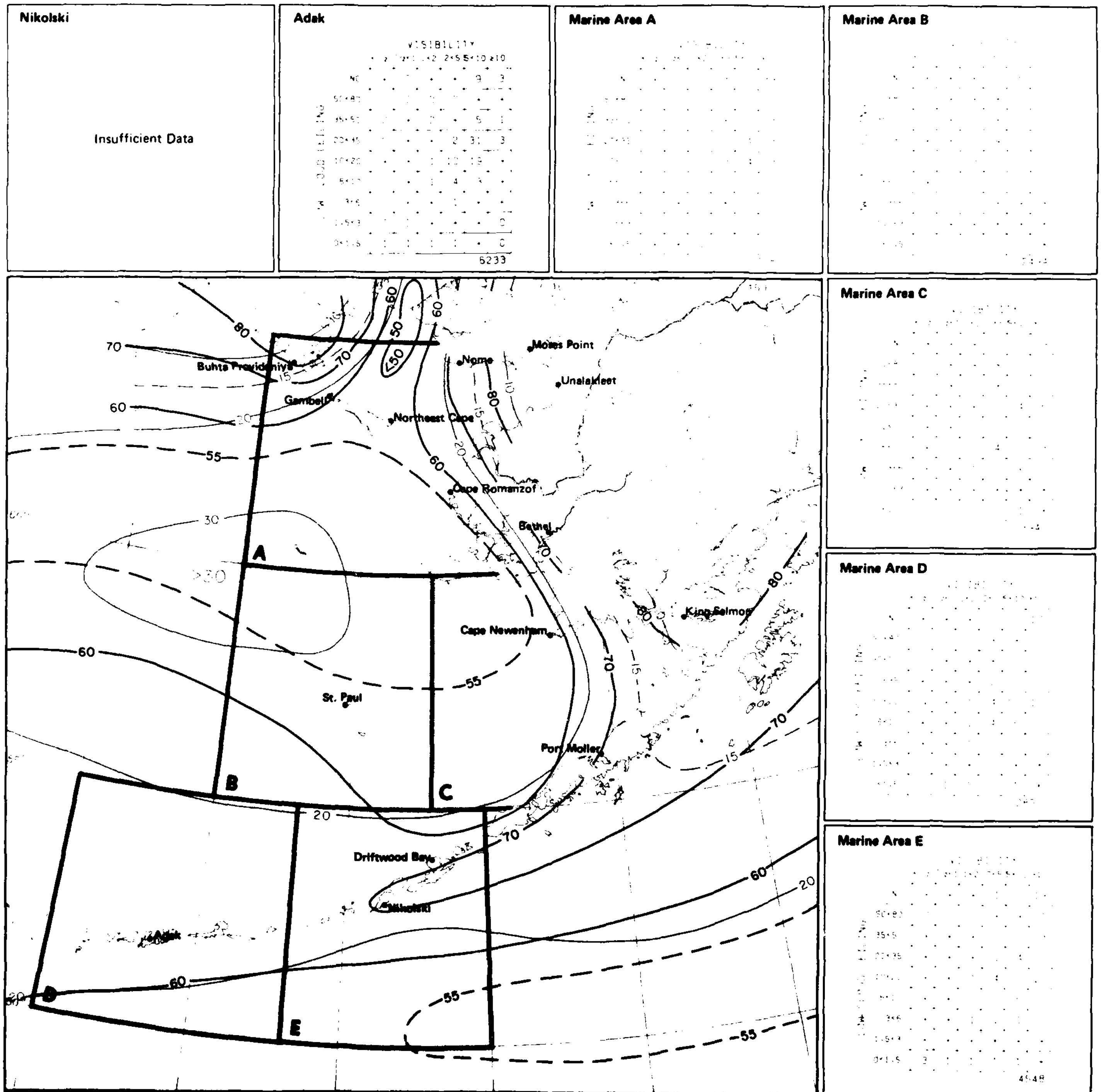
3995

Port Moller

Insufficient Data

Driftwood Bay

Insufficient Data

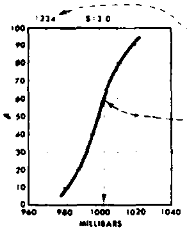


12 Low cloud ceiling and visibility thresholds

April

Legend

Sea level pressure



Number of observations

Cumulative percent frequency of sea level pressures equal to or less than the pressure intersected by the curve

S Standard deviation of pressure mbs

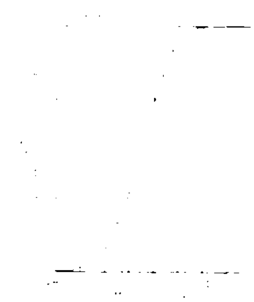
(60% of all observed sea level pressures were ≤1002 millibars)

Map - Mean sea level pressure

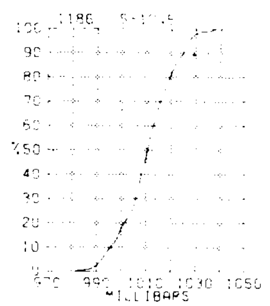
BLACK LINE Mean sea level pressure (millibars)

Sea level pressure is one of the most frequently recorded elements but one of the least accurate because of instrument and coding errors. Despite the inaccuracies of the individual readings, however, the large scale patterns and mean gradients of the isopleth analyses are relatively accurate

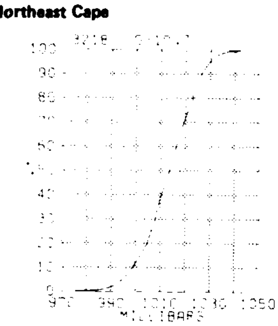
Buhta Provideniya



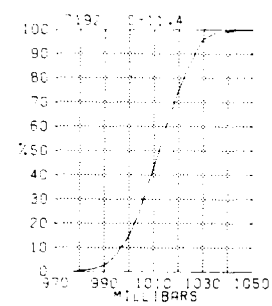
Gambell



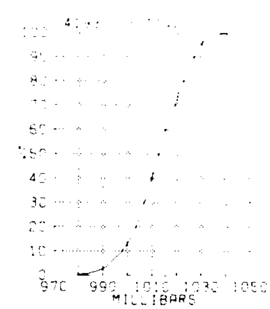
Northeast Cape



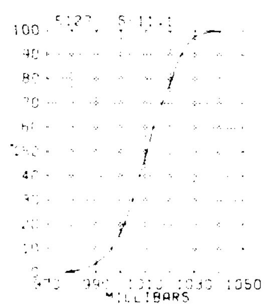
Nome



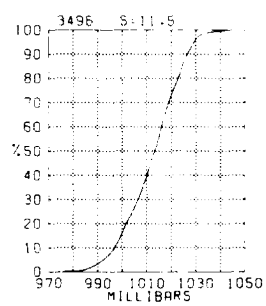
Moses Point



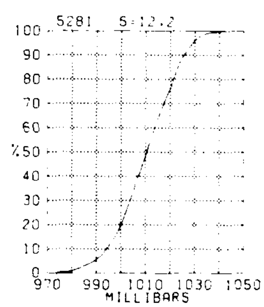
Unalakleet



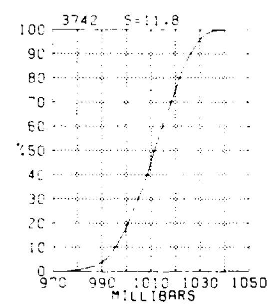
Cape Romanzof



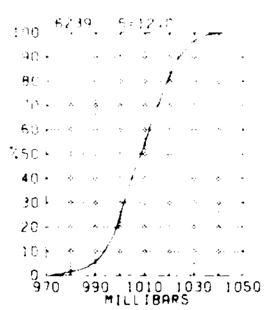
Bethel



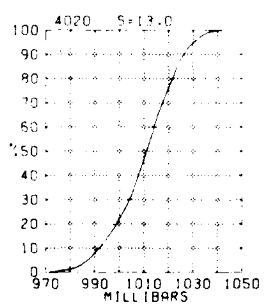
Cape Newenham



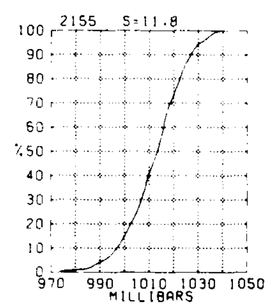
King Salmon



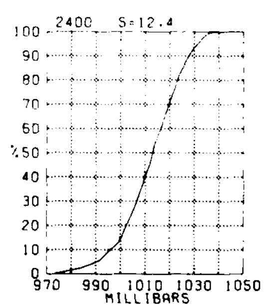
St. Paul



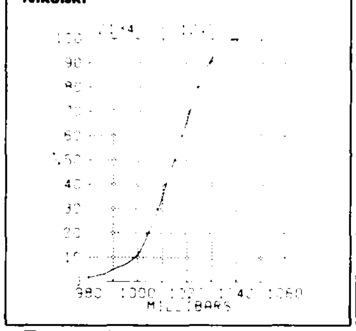
Port Moller



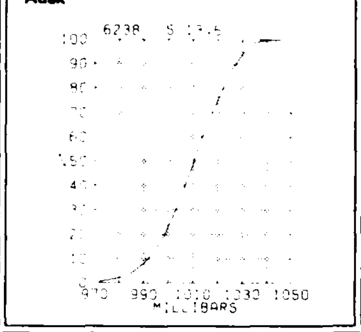
Driftwood Bay



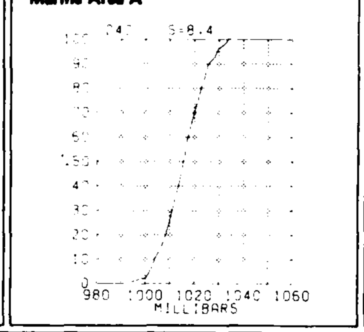
Nikolski



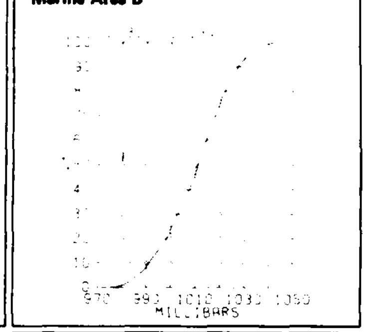
Adak

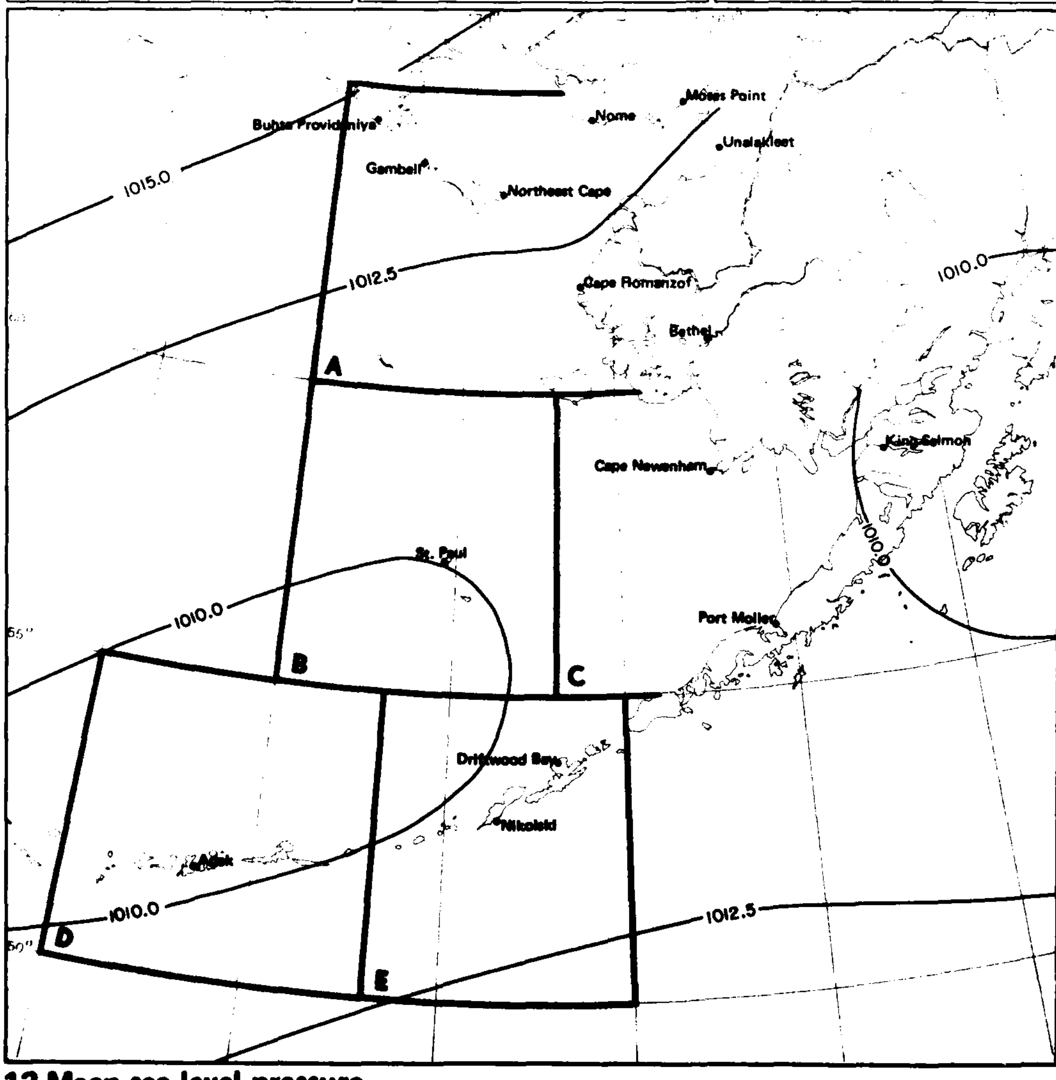


Marine Area A

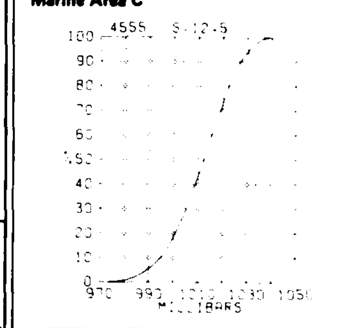


Marine Area B

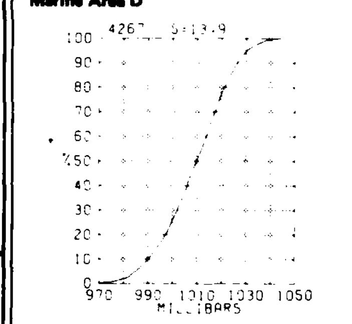




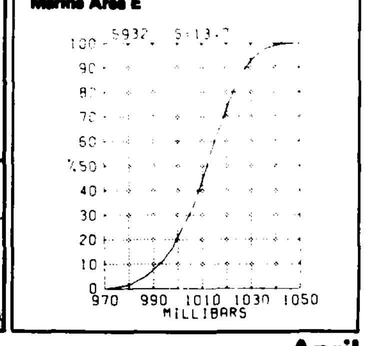
Marine Area C



Marine Area D



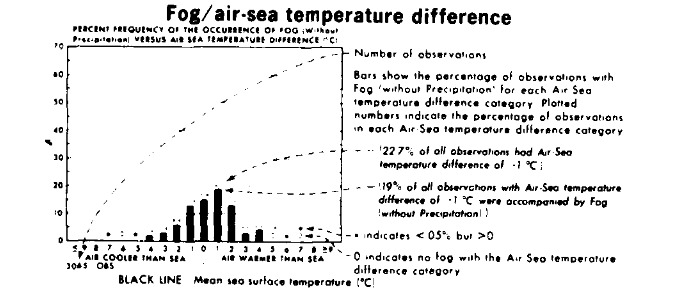
Marine Area E



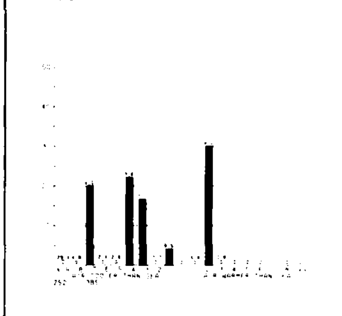
13 Mean sea level pressure

April

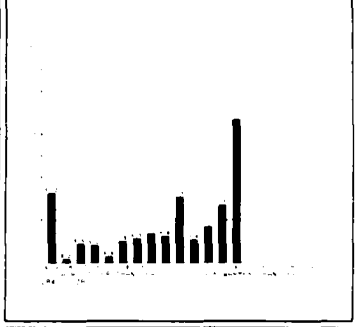
Legend



Marine Area A

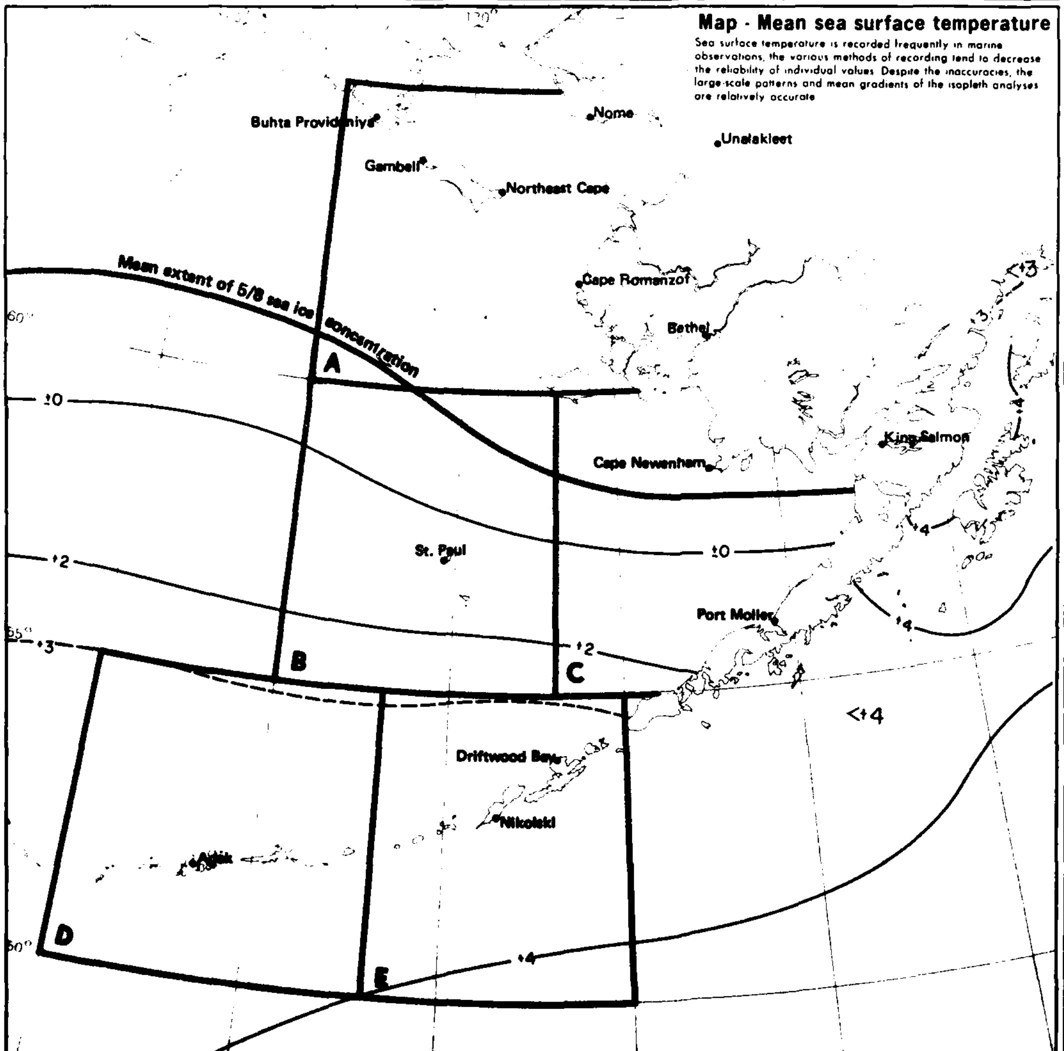


Marine Area B

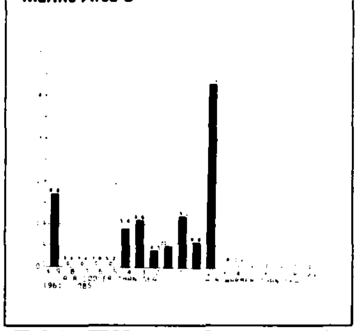


Map - Mean sea surface temperature

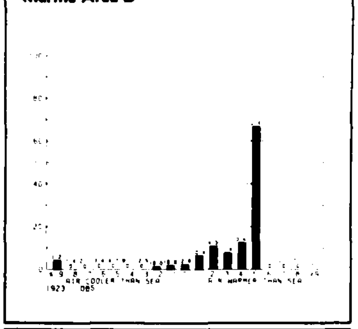
Sea surface temperature is recorded frequently in marine observations, the various methods of recording tend to decrease the reliability of individual values. Despite the inaccuracies, the large-scale patterns and mean gradients of the isopleth analyses are relatively accurate.



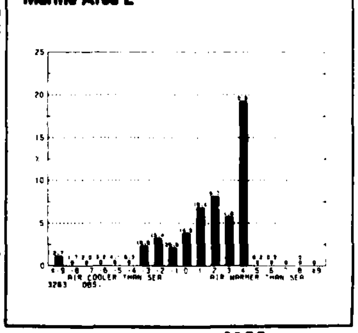
Marine Area C



Marine Area D



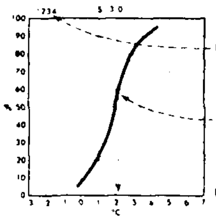
Marine Area E



14 Fog/air-sea temperature difference
Mean sea surface temperature

Legend

Sea surface temperature



Number of observations

Cumulative percent frequency of sea surface temperatures equal to or less than the temperature intersected by the curve

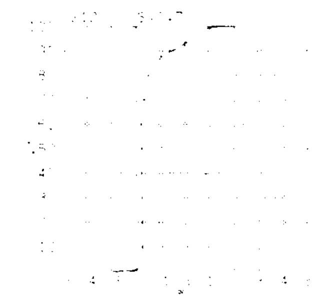
(60% of all observed sea surface temperatures were ≤2.1°C or ≤35.8°F)

S Standard deviation of sea surface temperatures (°C)

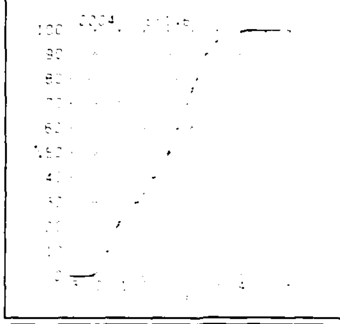
BLACK LINE Maximum (99%) sea surface temperature (°C) (1% of the temperatures were greater than the given value)

BLUE LINE Minimum (1%) sea surface temperature (°C) (1% of the temperatures were equal to or less than the given value)

Marine Area A

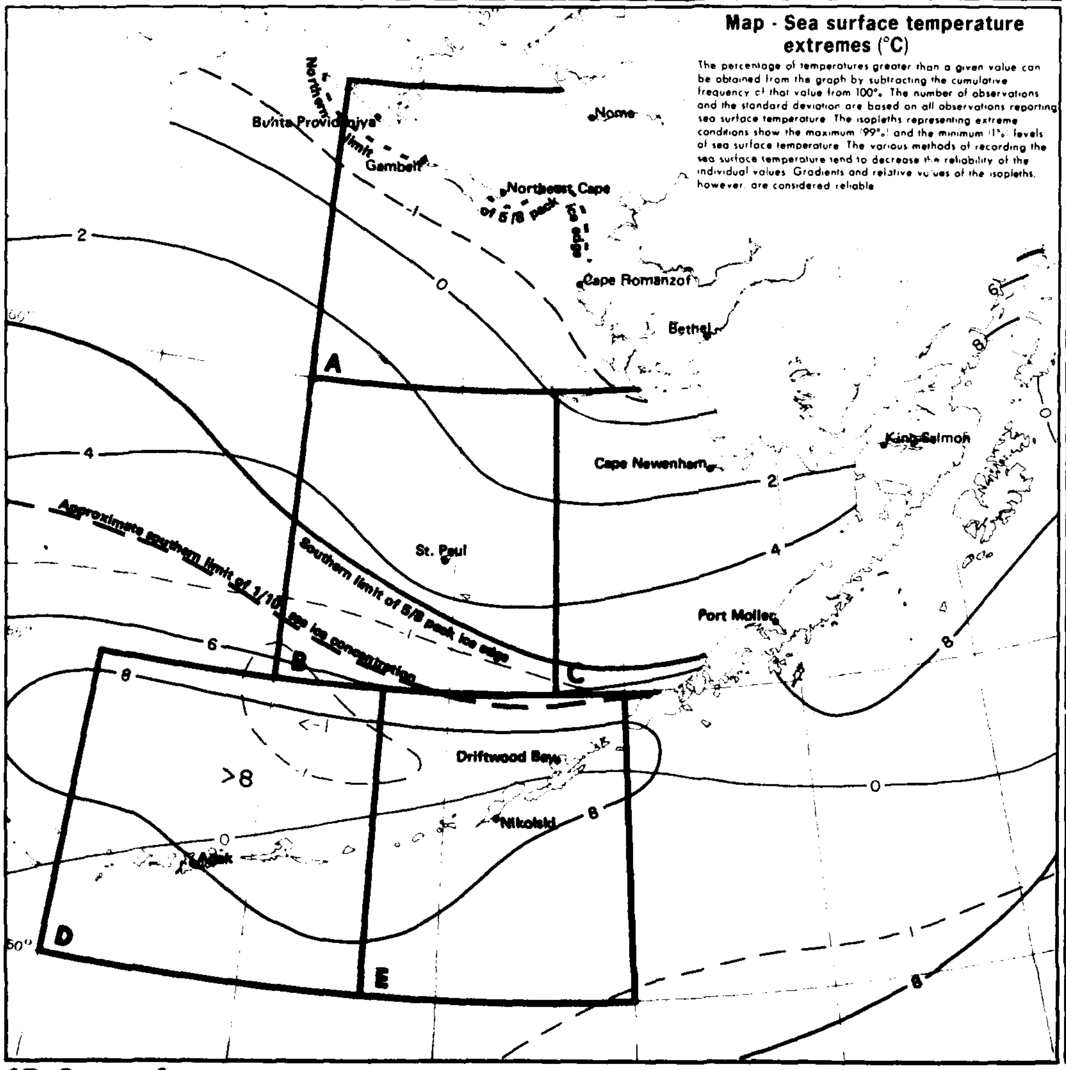


Marine Area B

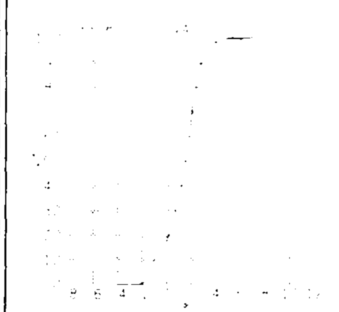


Map - Sea surface temperature extremes (°C)

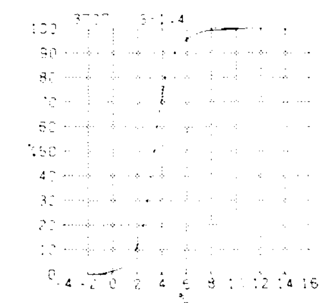
The percentage of temperatures greater than a given value can be obtained from the graph by subtracting the cumulative frequency of that value from 100%. The number of observations and the standard deviation are based on all observations reporting sea surface temperature. The isopleths representing extreme conditions show the maximum (99%) and the minimum (1%) levels of sea surface temperature. The various methods of recording the sea surface temperature tend to decrease the reliability of the individual values. Gradients and relative values of the isopleths, however, are considered reliable.



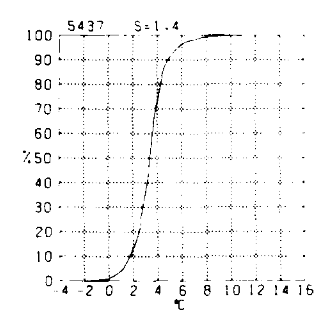
Marine Area C



Marine Area D



Marine Area E



15 Sea surface temperature extremes

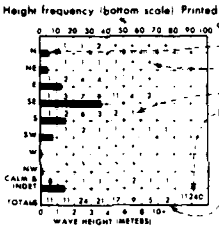
April

Legend

Wave height/direction

Direction frequency (top scale) Bars represent percent frequency of waves from each direction

Height frequency (bottom scale) Printed figures represent percent frequency of wave heights observed from each direction



WAVE HEIGHT INTERVAL

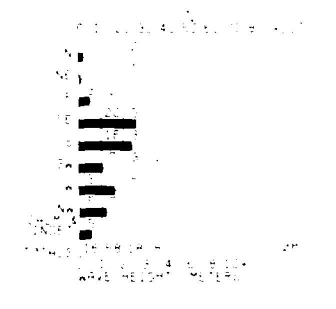
Feet	0-2	3-6	7-9	10-12	13-19	20-25	26-32	≥33
Meters	0-.5	1-1.5	2-2.5	3-3.5	4-5.5	6-7.5	8-9.5	≥10
	0	1	2	3	4	6	8	10+

Printed scale on bottom of chart

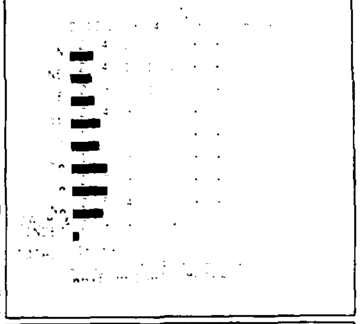
BLACK LINE Percent frequency of wave height <1.5 meters (<5 feet)

BLUE LINE Percent frequency of wave height <2.5 meters (<8 feet)

Marine Area A

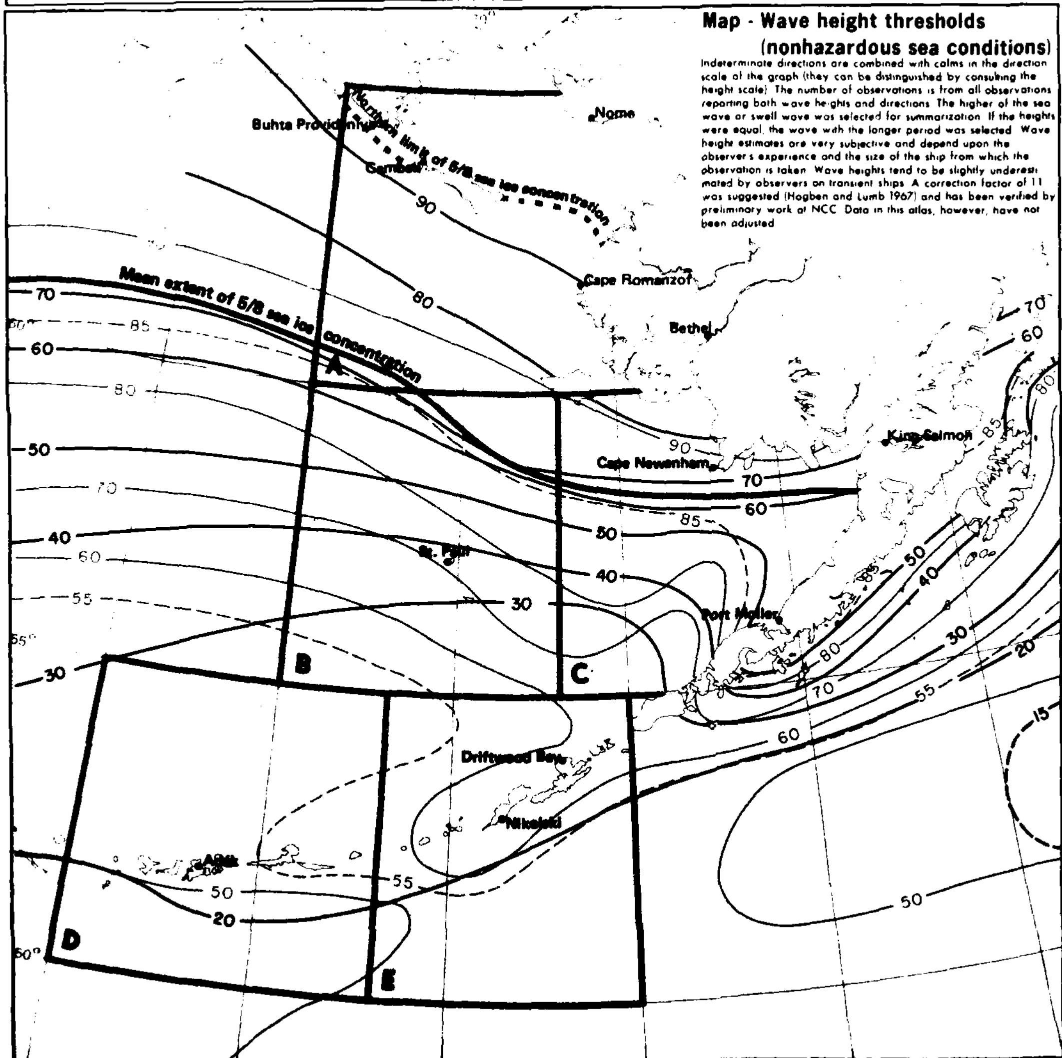


Marine Area B

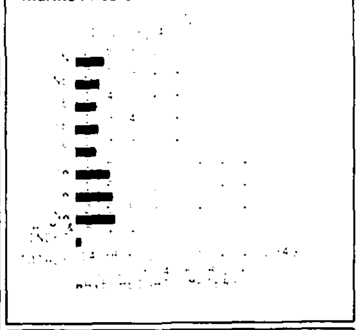


Map - Wave height thresholds (nonhazardous sea conditions)

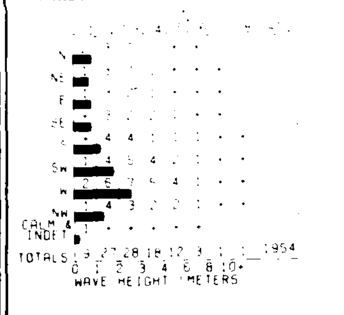
Indeterminate directions are combined with calms in the direction scale of the graph (they can be distinguished by consulting the height scale). The number of observations is from all observations reporting both wave heights and directions. The higher of the sea wave or swell wave was selected for summarization. If the heights were equal, the wave with the longer period was selected. Wave height estimates are very subjective and depend upon the observer's experience and the size of the ship from which the observation is taken. Wave heights tend to be slightly underestimated by observers on transient ships. A correction factor of 1.1 was suggested (Hogben and Lumb 1967) and has been verified by preliminary work at NCC. Data in this atlas, however, have not been adjusted.



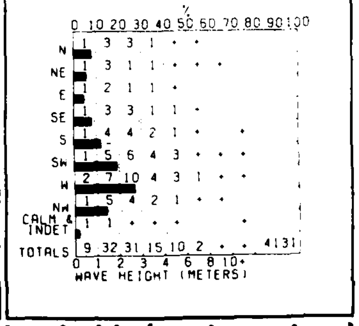
Marine Area C



Marine Area D



Marine Area E

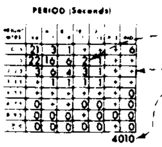


April

16 Wave height thresholds (nonhazardous)

Legend

Wave height/period



Percent frequency of occurrence of wave period and height

(2% of observed waves had a height of 1-1.5 meters and a period of 10-11 seconds.)

• indicates < 5% but >0

Number of observations

Waves are selected on the basis of the higher of sea and swell when both are reported. If both heights are equal, the wave with the longer period is selected.

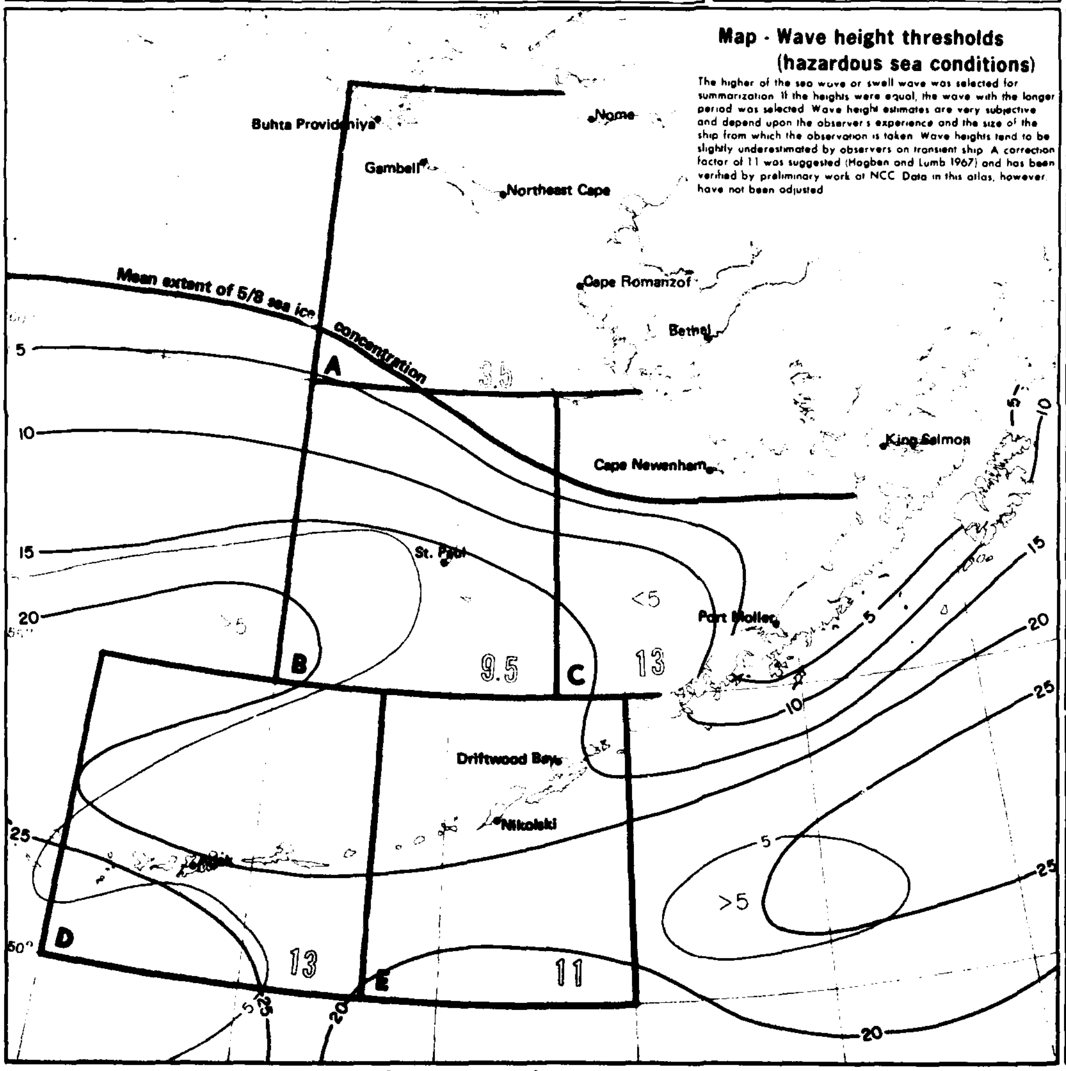
BLACK LINE	Percent frequency of wave height ≥3.5 meters (≥12 feet)
BLUE LINE	Percent frequency of wave height ≥6 meters (≥20 feet)
BLUE NUMBER	Maximum observed wave height (meters)

Marine Area A

Marine Area B

Map - Wave height thresholds (hazardous sea conditions)

The higher of the sea wave or swell wave was selected for summarization. If the heights were equal, the wave with the longer period was selected. Wave height estimates are very subjective and depend upon the observer's experience and the size of the ship from which the observation is taken. Wave heights tend to be slightly underestimated by observers on transient ship. A correction factor of 1.1 was suggested (Hogben and Lumb 1967) and has been verified by preliminary work at NCC. Data in this atlas, however, have not been adjusted.



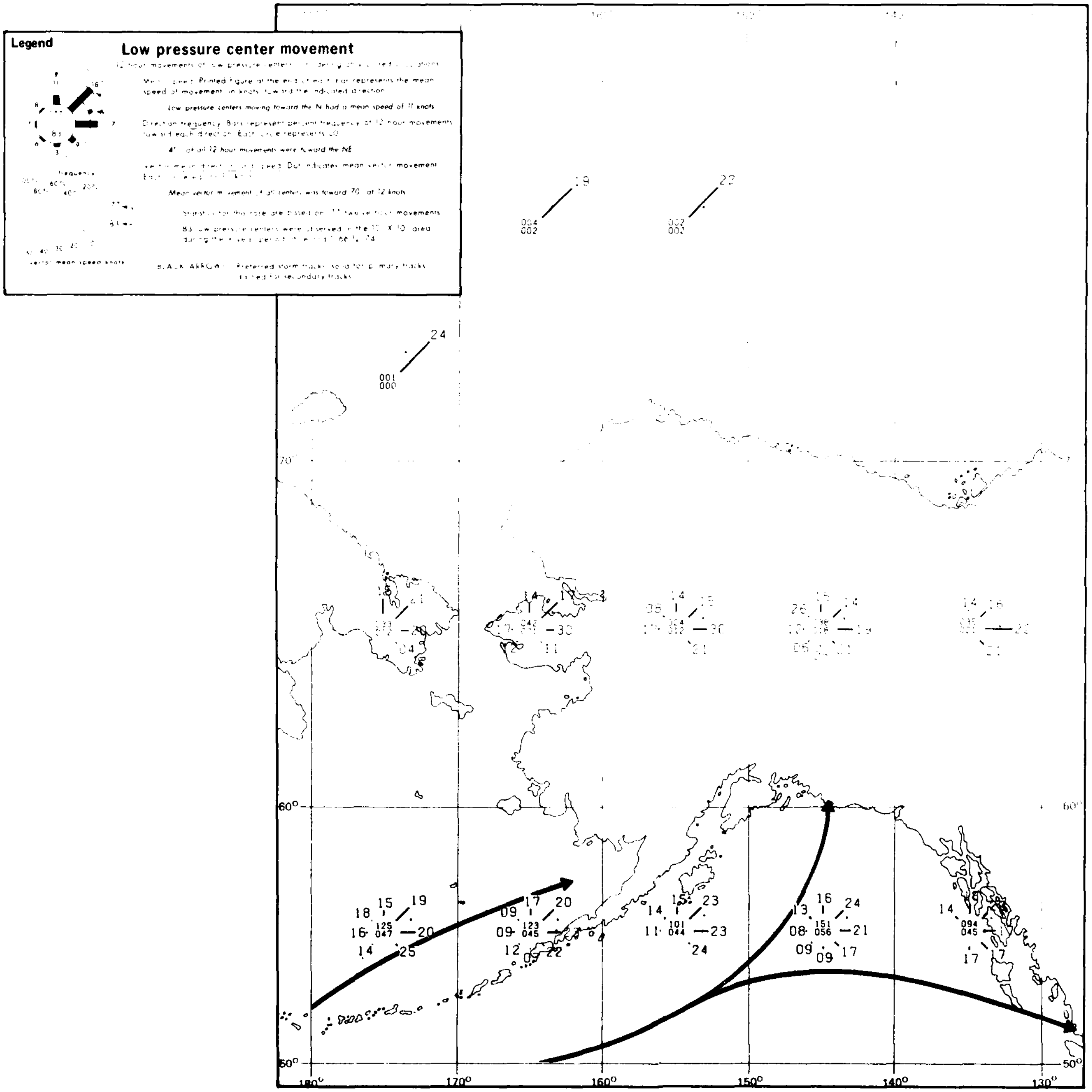
Marine Area C

Marine Area D

Marine Area E

17 Wave height thresholds (hazardous)

April

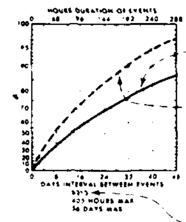


April

18 Low pressure center movement

Legend

Persistence of visibility <2 n. mi.



Hours duration of events Days interval between events

Cumulative percent frequency of hours duration equal to or less than the number of hours intersected by the solid curve

(80% of the events had a duration ≤216 hours.)

Cumulative percent frequency of days interval between events equal to or less than the number of days intersected by the broken curve

(88% of the events were followed by another event in 28 days or less.)

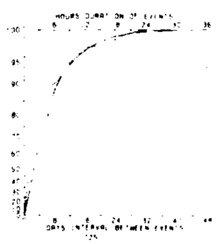
The maximum value(s) of hours duration and or the days interval will be displayed when the graph limits are exceeded

Durations and intervals for a particular month extend from the time they begin (or the first of the month if already in progress) and are terminated at the actual ending time, regardless of what month that may be

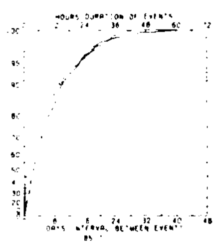
Number of observations

Top and bottom scales are variable to allow for variations in the data

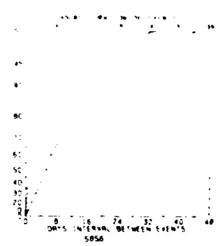
Adak



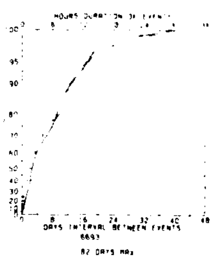
Nome



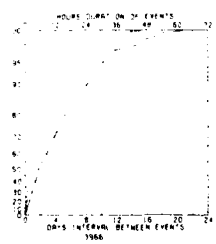
Moses Point



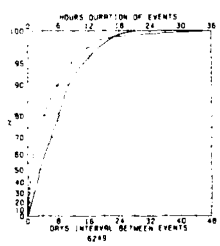
Unalakleet



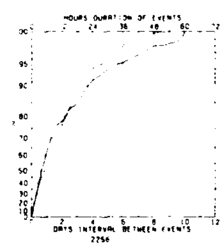
Cape Romanzof



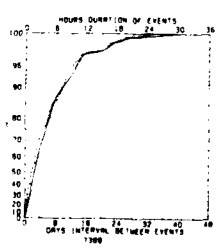
Bethel



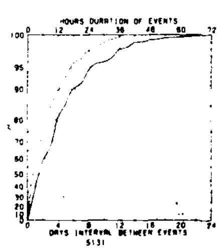
Nikolski



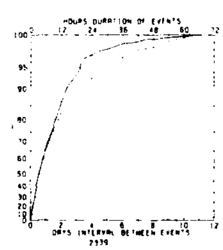
King Salmon



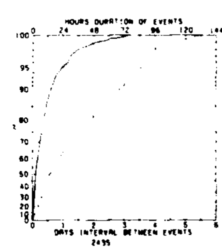
St. Paul



Port Moller



Driftwood Bay

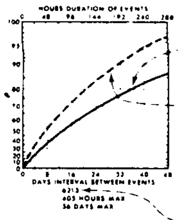


19 Persistence of visibility <2 n. mi.

April

Legend

Persistence of wind ≥10 kts.



Hours duration of events   Days interval between events

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(80% of the events had a duration ≤216 hours.)

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(88% of the events were followed by another event in 28 days or less.)

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Number of observations

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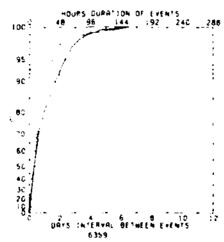
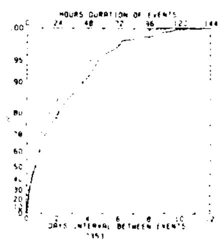
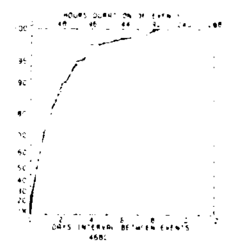
Adak



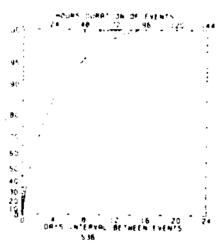
Nome



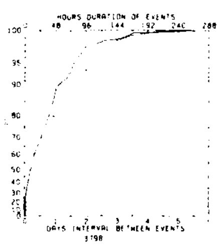
Moses Point



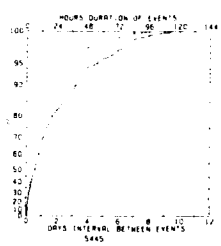
Unalakleet



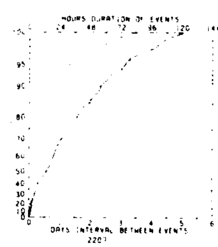
Cape Romanzof



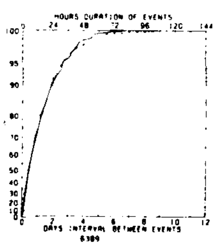
Bethel



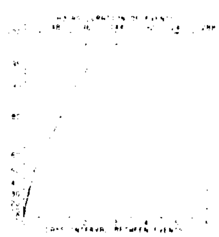
Nikolski



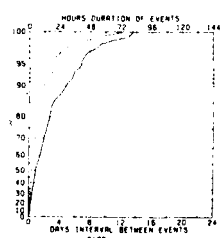
King Salmon



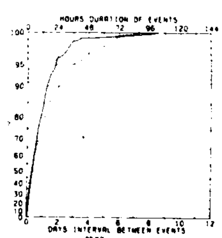
St. Paul



Port Moller

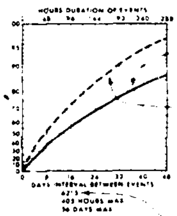


Driftwood Bay



Legend

Persistence of wind ≥20 kts.



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Number of observations

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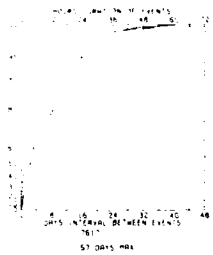
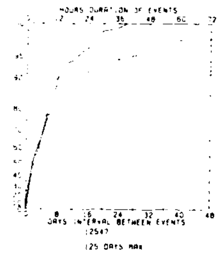
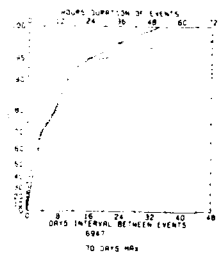
Adak



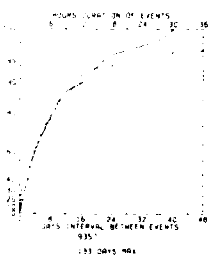
Nome



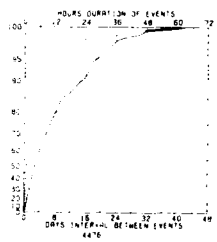
Moses Point



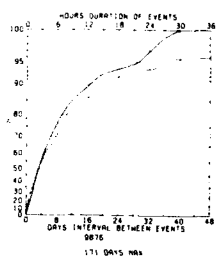
Unalakleet



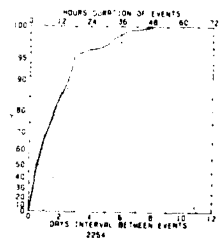
Cape Romanzof



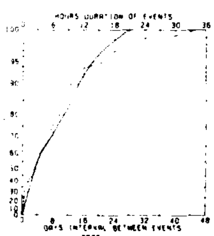
Bethel



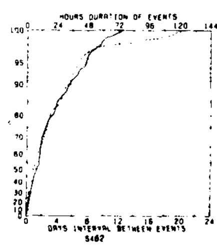
Nikolski



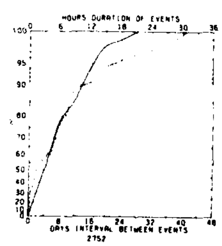
King Salmon



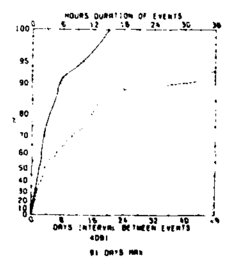
St. Paul



Port Moller



Driftwood Bay



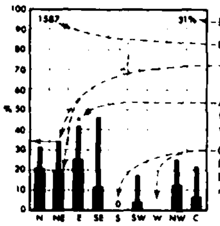
21 Persistence of wind ≥20 kts.

April

Legend

Precipitation/wind direction

Percent frequency of surface wind observations from each direction and calm that were accompanied by precipitation, subdivided into liquid type (including freezing rain and freezing drizzle) and snow



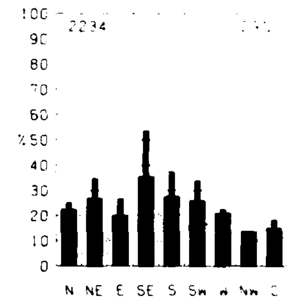
- Percentage of present weather observations reporting precipitation
- Number of observations
- (34% of all NE winds were accompanied by precipitation, of which 14% was liquid and 20% was snow)
- An asterisk in the column for a given direction (or calm) indicates that the percentage was based on 10-30 observations of present weather and wind direction
- 0 replaces bar when no precipitation was observed with winds from a given direction (or calm). No bar graph is presented if less than 10 observations containing present weather were reported for a given direction (or calm)

Map · Precipitation

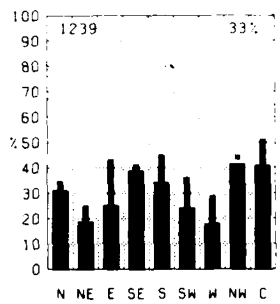
BLACK LINE Percent frequency of observations reporting precipitation

Of all the elements recorded in historical marine observations, precipitation is one of those most subject to interpretation error, from coding practices, observers preference for certain present weather codes, and other biases

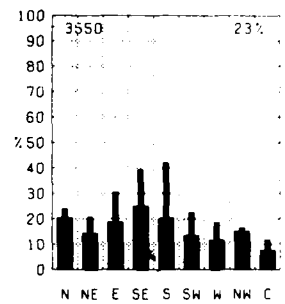
Buhta Provideniya



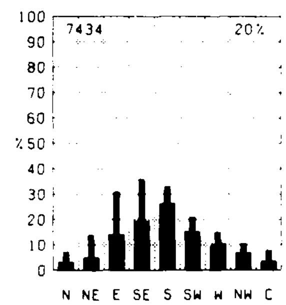
Gambell



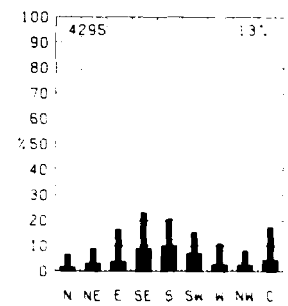
Northeast Cape



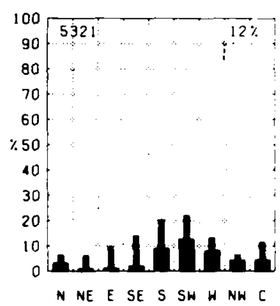
Nome



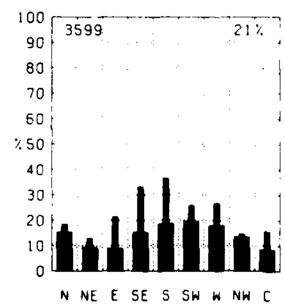
Moses Point



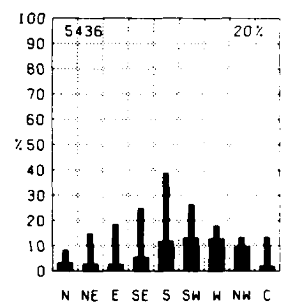
Unalakleet



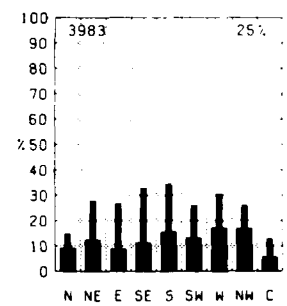
Cape Romanzof



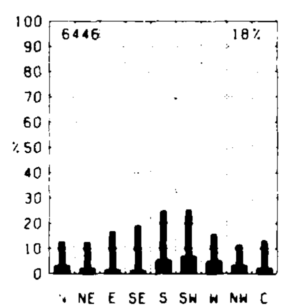
Bethel



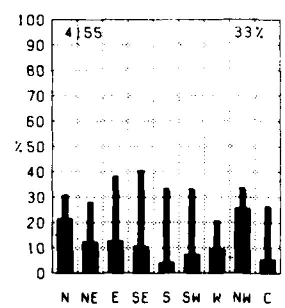
Cape Newenham



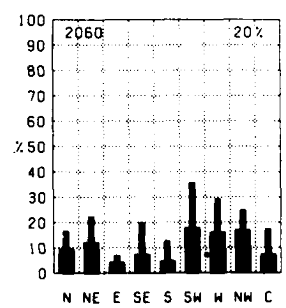
King Salmon



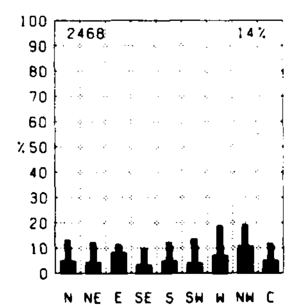
St. Paul

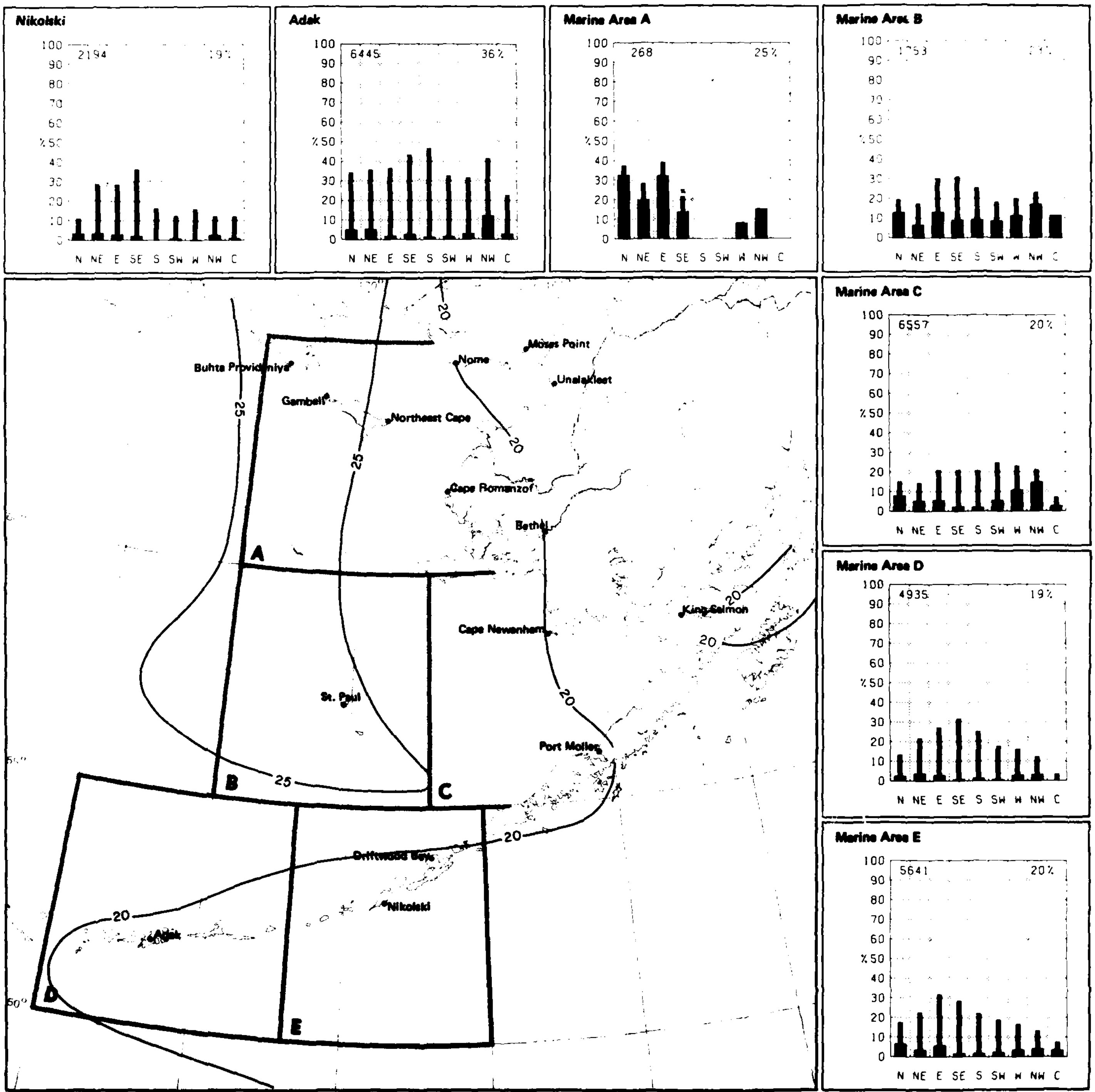


Port Moller



Driftwood Bay



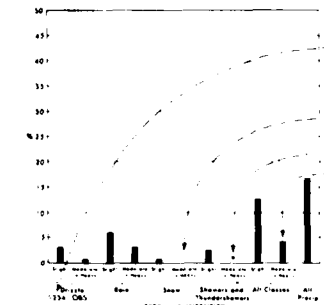


1 Precipitation

May

Legend

Precipitation types



Percent frequency of precipitation by type and intensity

Number of observations

Bars show percent frequency of observations reporting Precipitation of various types and intensities

0 indicates no observations in the category

+ indicates <.05% but >0

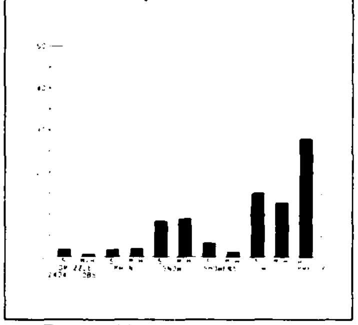
(40% of all observations recorded moderate to heavy precipitation)

Map - Snow

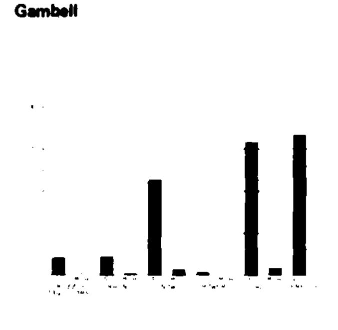
BLACK LINE Percent frequency of precipitation observations reporting snow

The percent frequency of observations reporting snow for a given point can be determined by multiplying the percent frequency of observations reporting precipitation (map 1) with that of precipitation observations reporting snow (map 2)

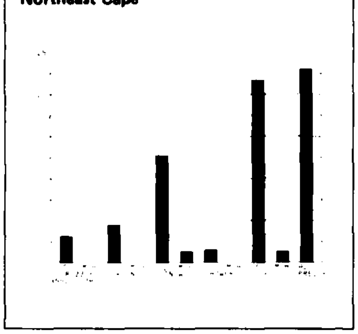
Buhta Provideniya



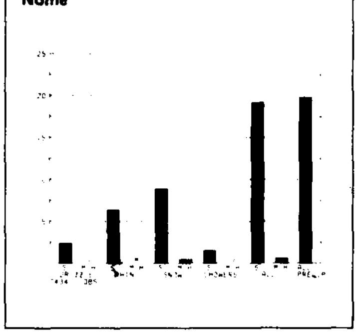
Gambell



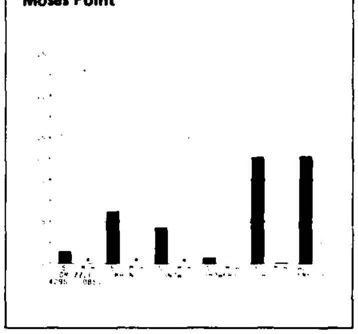
Northeast Cape



Nome

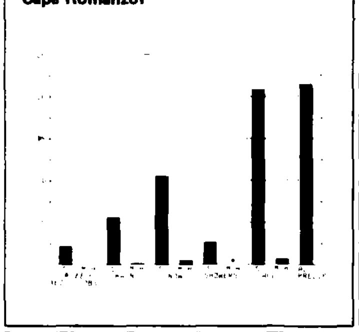


Moses Point

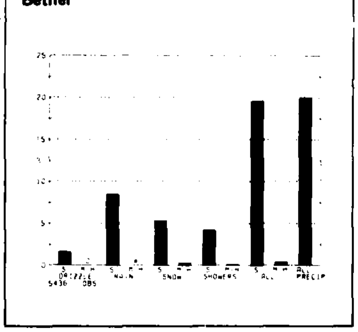


Unalakleet

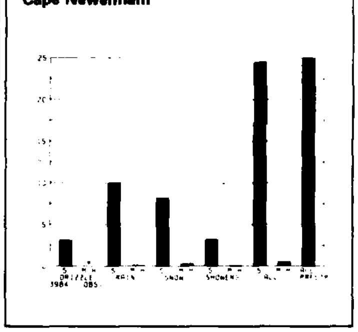
Cape Romanzof



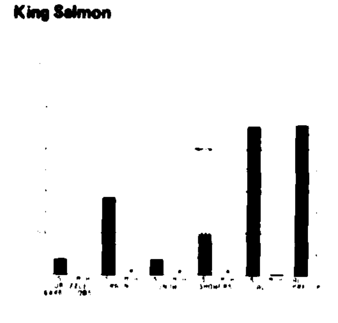
Bethel



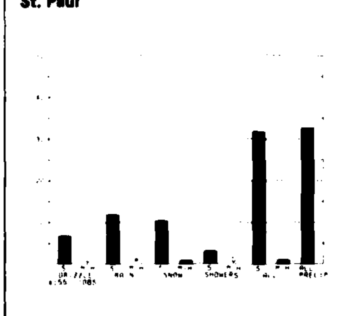
Cape Newenham



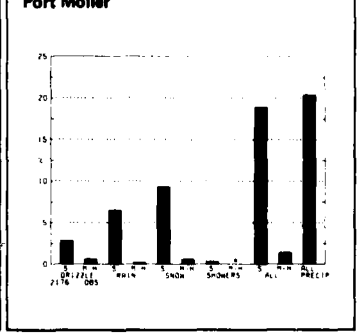
King Salmon



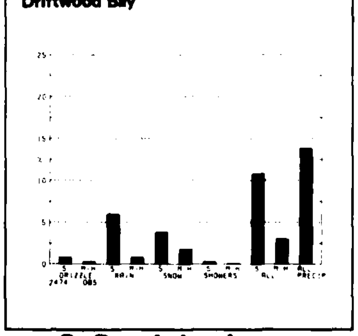
St. Paul

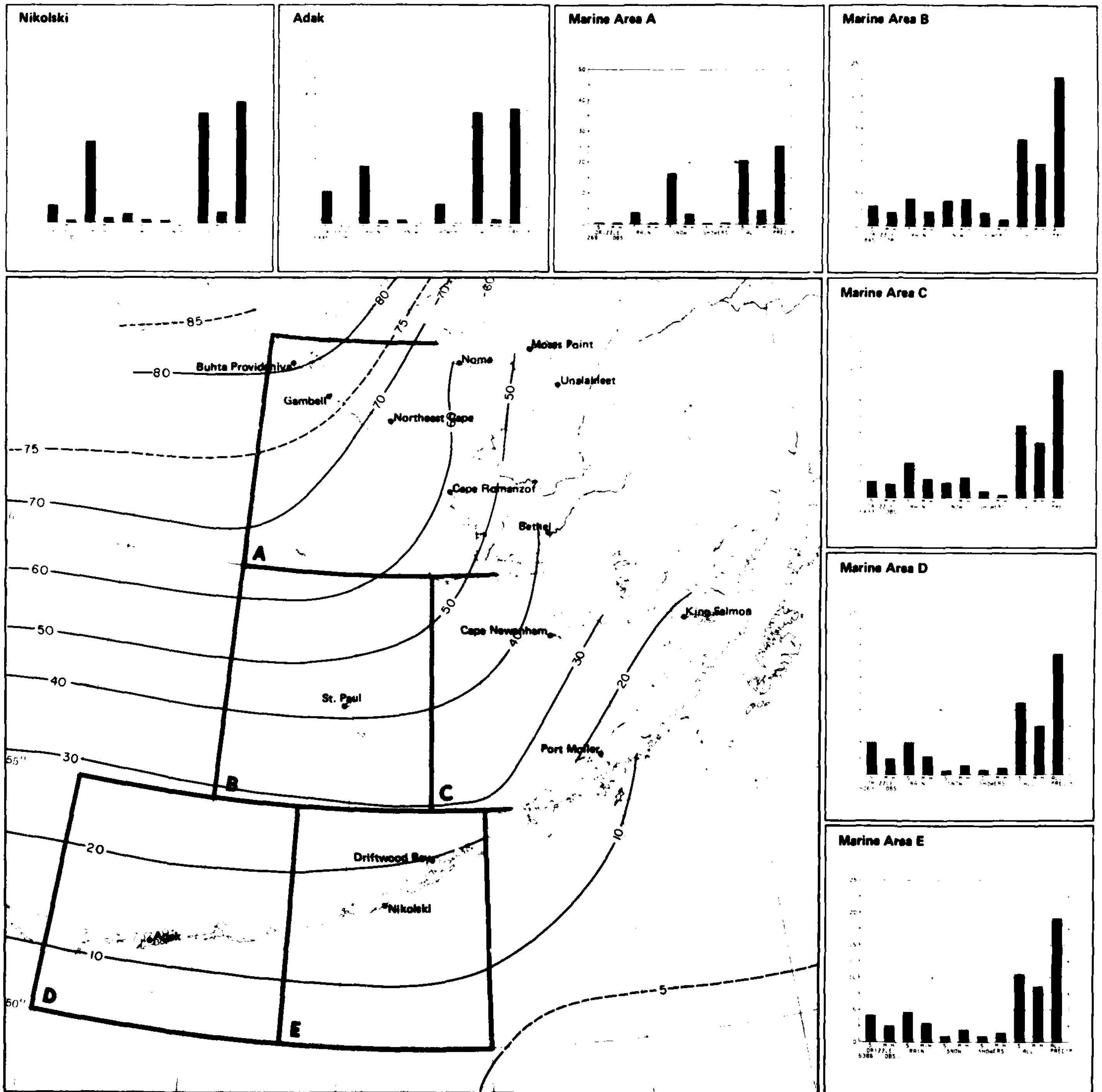


Port Moller



Driftwood Bay



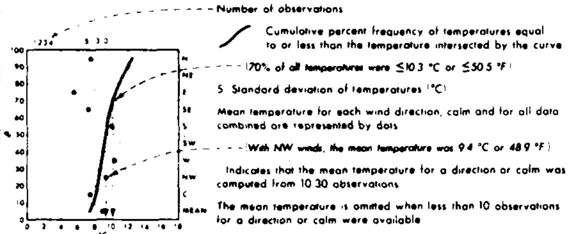

Nikolski
Adak
Marine Area A
Marine Area B
Marine Area C
Marine Area D
Marine Area E
Buhta Providenija
Gambell
Nome
Moses Point
Unalakleet
Northeast Cape
Cape Romanzof
Bethel
Cape Newenham
King Salmon
St. Paul
Port Moller
Driftwood Bay
Nikolski
Adak
A
B
C
D
E
85
80
75
70
60
50
40
30
20
10
5

2 Snow

May

Legend

Air temperature/wind direction



Map · Air temperature mean and thresholds

BLACK LINE Percent frequency of temperature ≤0°C (≤32°F)

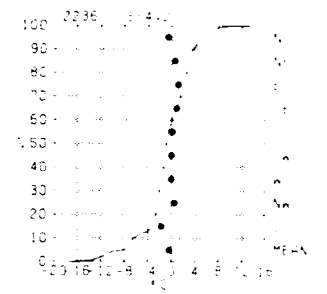
RED LINE Mean air temperature (°C)

BLUE LINE Percent frequency of wind chill temperature ≤-30°C (≤-22°F)

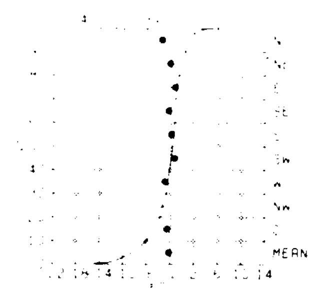
Air temperature readings recorded on transient ships in warm, sunny weather appear biased toward high temperatures, apparently because of improper instrument exposure and ventilation. Despite the inaccuracies, the large-scale patterns and mean gradients of the isopleth analyses are relatively accurate.

The temperature scale of the graph may vary in both range and class interval. The percentage of temperature observations greater than a given value can be obtained by subtracting the cumulative percent frequency of that value from 100%. The number of observations and the standard deviation plus the plotted points on the graphs are based on those observations reporting both temperature and wind direction. The cumulative curve is based on all observations reporting temperature with or without wind direction.

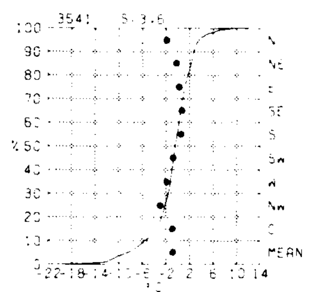
Buhta Provideniya



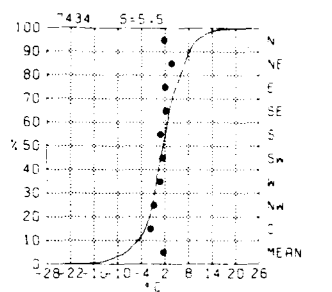
Gambell



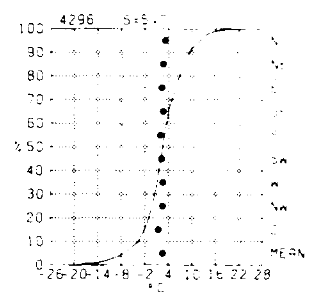
Northeast Cape



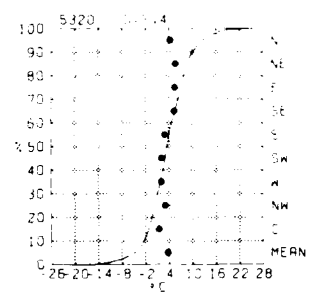
Nome



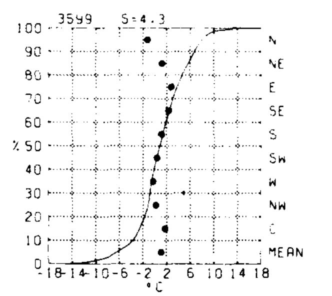
Moses Point



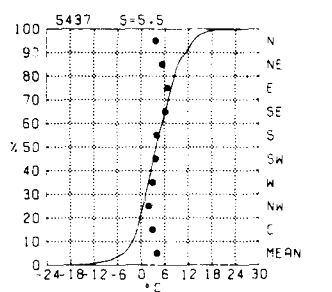
Unalakleet



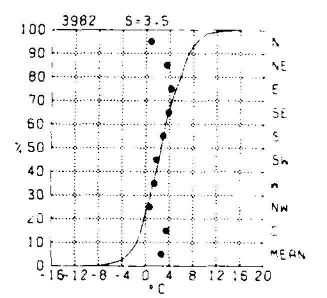
Cape Romanzof



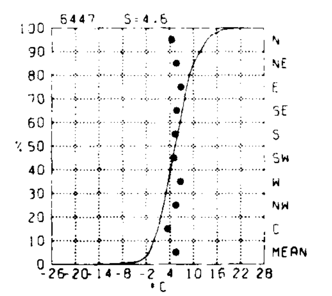
Bethel



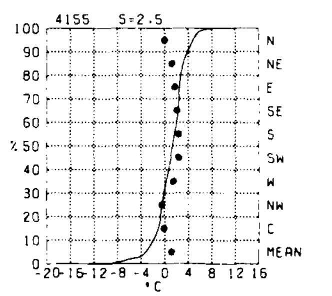
Cape Newenham



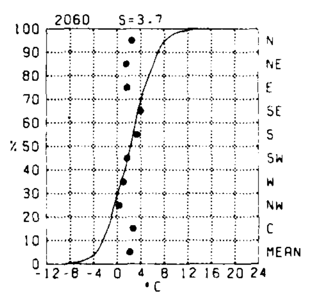
King Salmon



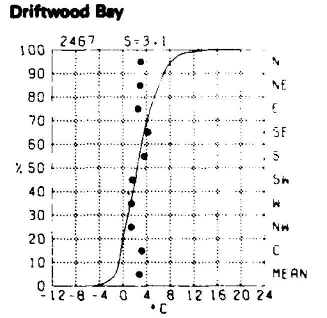
St. Paul

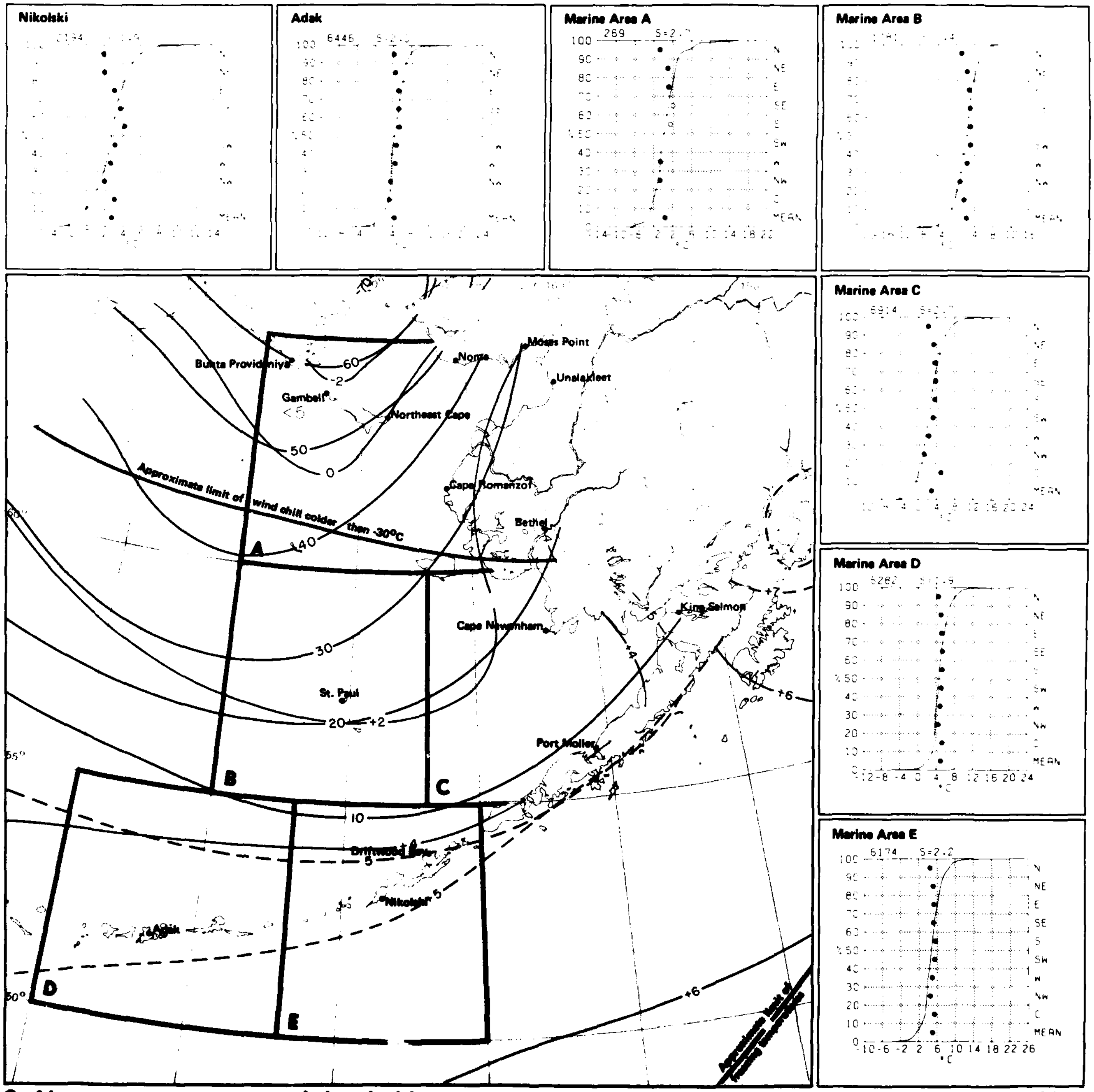


Port Moller



Driftwood Bay



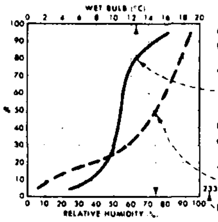


3 Air temperature mean and thresholds

May

Legend

Wet bulb/relative humidity



Cumulative percent frequency of wet bulb temperatures equal to or less than the temperature intersected by the curve (top scale)

Wet bulb (°C)

(80% of all observed wet-bulb temperatures were ≤12.5°C or 54.5°F)

Cumulative percent frequency of relative humidities equal to or less than the humidity intersected by the curve (bottom scale)

Relative humidity (%)

(50% of all observed relative humidities were ≤74%)

Number of observations

Map - Mean dew point temperature

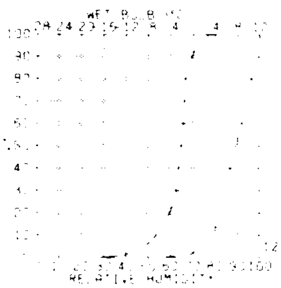
BLACK LINE Mean dew point temperature (°C)

The observation count of the graph reflects those observations reporting both air and wet bulb temperatures, both are required in computing the relative humidity. The percentage of observations of either element greater than a given value can be obtained by subtracting the cumulative percent frequency of that value from 100%.

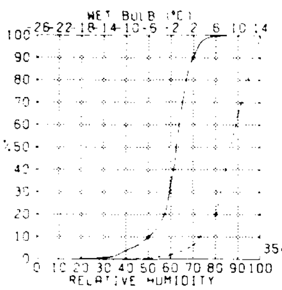
Buhta Provideniya

Insufficient Data

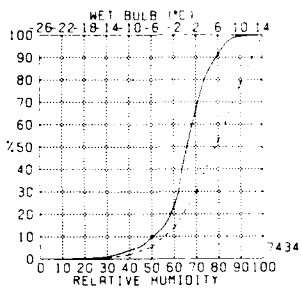
Gambell



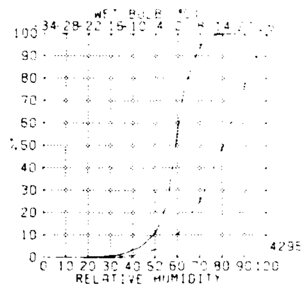
Northeast Cape



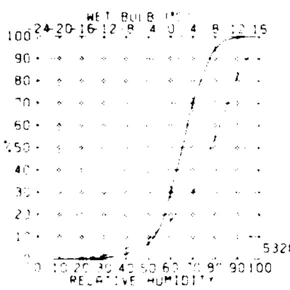
Nome



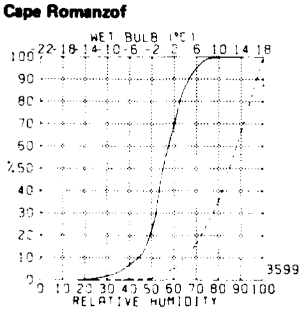
Moses Point



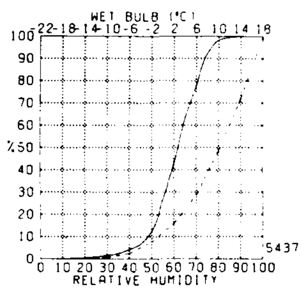
Unalakleet



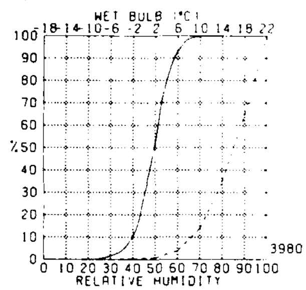
Cape Romanzof



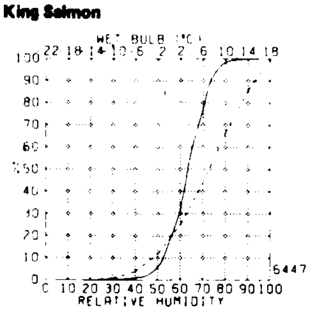
Bethel



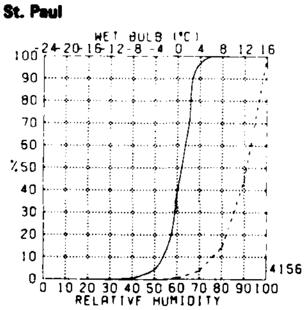
Cape Newenham



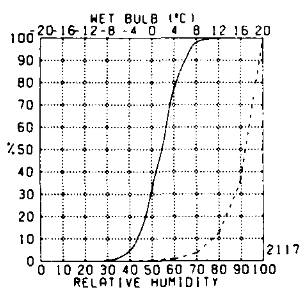
King Salmon



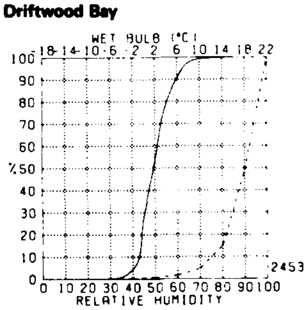
St. Paul

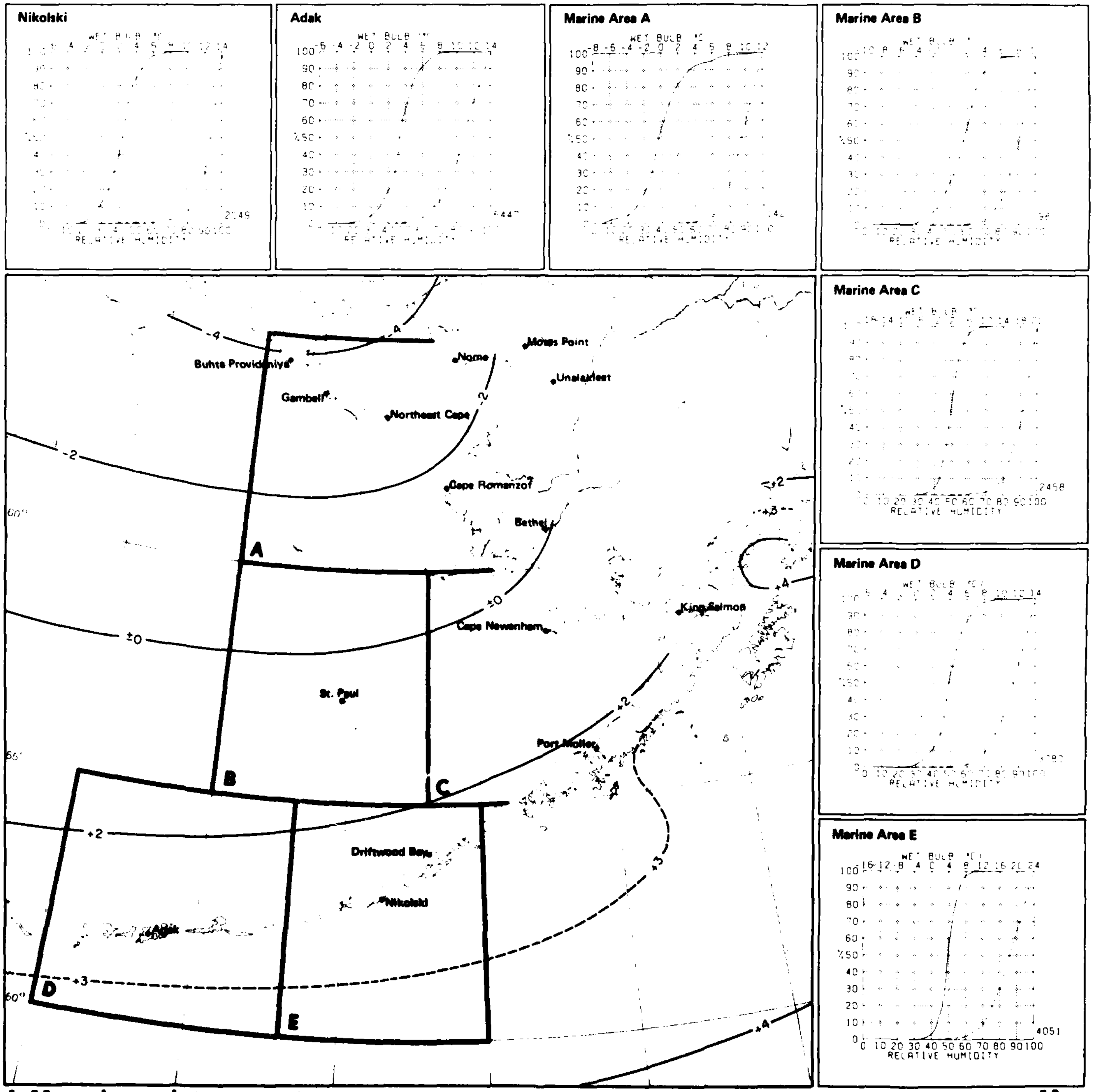


Port Moller



Driftwood Bay



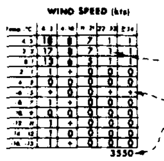


4 Mean dew point temperature

May

Legend

Air temperature/wind speed



Percent frequency of simultaneous occurrence of specified temperature (°C) and wind speed (knots)

(1% of all observations reported temperature 2-3°C simultaneously with wind speed of 22-33 kts.)

+ Indicates < 5% but >0

Number of observations

Map - Air temperature extremes (°C)

BLACK LINE - Maximum (99%) air temperature (1% of temperatures were greater than the given value)

BLUE LINE - Minimum (1%) air temperature (1% of temperatures were equal to or less than the given value)

The graph can be used to determine the extent of human discomfort from the combined effects of extreme heat or cold and winds or to estimate the likelihood of superstructure icing. Icing potential increases as the air temperature drops below freezing and the winds increase above 10 knots (12 mph) and may become quite severe with temperatures equal to or less than -9°C (16°F) and winds equal to or greater than 34 knots (39 mph)

Buhta Provideniya

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
12.13	0	+	0	0	0
10.11	0	+	+	0	0
8.9	+	1	+	0	0
6.7	1	2	+	+	0
4.5	2	4	+	+	0
2.3	4	8	2	+	0
0.1	10	17	5	+	+
-2.-1	7	8	2	+	0
-4.-3	4	4	+	+	0
-6.-5	1	2	+	+	0
≤-7	3	4	1	0	0

2236

Gambell

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
6.7	0	0	+	0	0
4.5	0	+	+	0	0
2.3	+	2	2	+	0
0.1	1	5	11	1	0
-2.-1	2	11	21	7	0
-4.-3	1	5	10	5	0
-6.-5	1	1	4	+	0
-8.-7	+	1	3	+	0
-10.-9	+	1	1	+	0
-12.-11	+	1	+	0	0
≤-13	0	1	+	0	0

1240

Northeast Cape

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
10.11	+	0	0	0	0
8.9	+	+	+	0	0
6.7	1	+	+	+	+
4.5	1	2	1	+	+
2.3	4	8	5	1	+
0.1	5	13	9	2	+
-2.-1	5	11	8	1	+
-4.-3	3	5	3	+	0
-6.-5	1	2	1	+	0
-8.-7	1	1	1	+	0
≤-9	1	2	2	+	0

3541

Nome

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
24.25	0	0	+	0	0
22.23	0	+	+	0	0
20.21	0	+	+	0	0
18.19	0	+	+	+	0
16.17	0	+	+	+	0
14.15	+	+	+	+	0
12.13	+	1	1	+	0
10.11	+	1	1	+	0
8.9	+	3	2	+	0
6.7	1	5	4	+	0
≤5	14	40	22	2	+

7434

Moses Point

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
24.25	0	0	+	0	0
22.23	0	+	+	0	0
20.21	0	+	+	0	0
18.19	+	+	+	+	0
16.17	+	+	+	+	0
14.15	+	1	1	+	0
12.13	1	1	1	+	0
10.11	1	2	2	+	0
8.9	1	3	3	+	0
6.7	2	6	3	+	0
≤5	12	37	22	1	+

4296

Unalakleet

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
26.27	0	0	+	0	0
24.25	0	+	+	0	0
22.23	0	+	+	0	0
20.21	0	+	+	0	0
18.19	+	+	+	+	0
16.17	+	+	1	+	0
14.15	+	1	1	+	0
12.13	+	2	2	+	0
10.11	+	3	2	+	0
8.9	1	5	3	+	0
≤7	14	43	21	1	0

5320

Cape Romanzof

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
16.17	+	+	+	0	0
14.15	+	+	+	0	0
12.13	+	+	+	0	0
10.11	+	1	1	+	0
8.9	1	2	1	+	0
6.7	2	5	3	+	0
4.5	2	4	4	+	0
2.3	4	6	7	1	+
0.1	3	7	9	2	+
-2.-1	4	6	7	1	+
≤-3	2	6	5	2	+

3599

Bethel

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
26.27	0	0	+	0	0
24.25	0	0	+	0	0
22.23	0	+	+	0	0
20.21	0	+	+	0	0
18.19	0	+	+	0	0
16.17	+	1	1	0	0
14.15	+	1	1	+	0
12.13	+	3	2	+	0
10.11	+	3	2	+	0
8.9	1	6	4	+	0
≤7	5	43	24	2	+

5437

Cape Newenham

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
14.15	+	+	+	0	0
12.13	+	+	+	0	0
10.11	1	1	+	0	0
8.9	2	3	1	+	+
6.7	5	5	4	+	+
4.5	4	5	6	1	0
2.3	7	10	8	1	+
0.1	4	7	6	+	+
-2.-1	3	4	4	+	0
-4.-3	1	1	2	+	0
≤-5	+	+	1	+	0

3982

King Salmon

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
22.23	0	+	+	0	0
20.21	+	+	+	0	0
18.19	+	+	+	0	0
16.17	+	1	1	0	0
14.15	+	1	1	+	0
12.13	+	3	2	+	0
10.11	+	3	3	1	+
8.9	1	6	6	1	+
6.7	2	9	7	1	+
4.5	2	8	5	1	+
≤3	7	19	8	+	+

6447

St. Paul

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
8.9	0	+	+	0	0
6.7	0	1	1	+	0
4.5	+	3	7	1	0
2.3	+	10	22	4	+
0.1	1	8	14	3	+
-2.-1	+	5	8	3	+
-4.-3	+	1	2	1	+
-6.-5	+	+	+	+	+
-8.-7	+	+	1	+	0
-10.-9	0	0	+	+	0
≤-11	0	+	0	0	0

4155

Port Moller

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
18.19	0	+	0	0	0
16.17	+	0	0	0	0
14.15	0	+	0	0	0
12.13	+	+	+	0	0
10.11	+	1	+	0	0
8.9	1	3	1	+	0
6.7	4	6	3	+	0
4.5	4	7	5	+	+
2.3	7	12	4	+	+
0.1	4	9	3	+	0
≤-1	4	13	7	1	0

2060

Driftwood Bay

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
18.19	0	+	0	0	0
16.17	0	0	0	0	0
14.15	0	0	+	0	0
12.13	+	+	+	+	0
10.11	+	1	+	+	0
8.9	1	2	2	+	0
6.7	3	6	3	+	0
4.5	5	8	2	+	+
2.3	8	15	5	+	0
0.1	5	12	5	+	+
≤-1	1	8	4	+	0

2467

Nikolski

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥34
14,15	0	+	0	0	0
12,13	0	+	0	0	0
10,11	0	+	+	0	0
8,9	+	1	+	+	0
6,7	1	3	2	+	0
4,5	2	10	10	2	0
2,3	3	15	22	6	+
0,1	1	4	8	4	1
-2,-1	+	1	2	2	+
-4,-3	0	0	0	0	0
-6,-5	0	0	0	0	0

2194

Adak

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥34
16,17	+	+	0	0	0
14,15	+	+	+	0	0
12,13	+	+	+	+	0
10,11	+	+	+	+	[illegible]
8,9	+	2	3	+	+
6,7	2	11	12	3	+
4,5	4	14	13	4	1
2,3	4	9	9	3	+
0,1	1	1	1	+	0
-2,-1	+	+	+	0	0
-4,-3	+	0	0	0	0

6446

Marine Area A

[illegible]

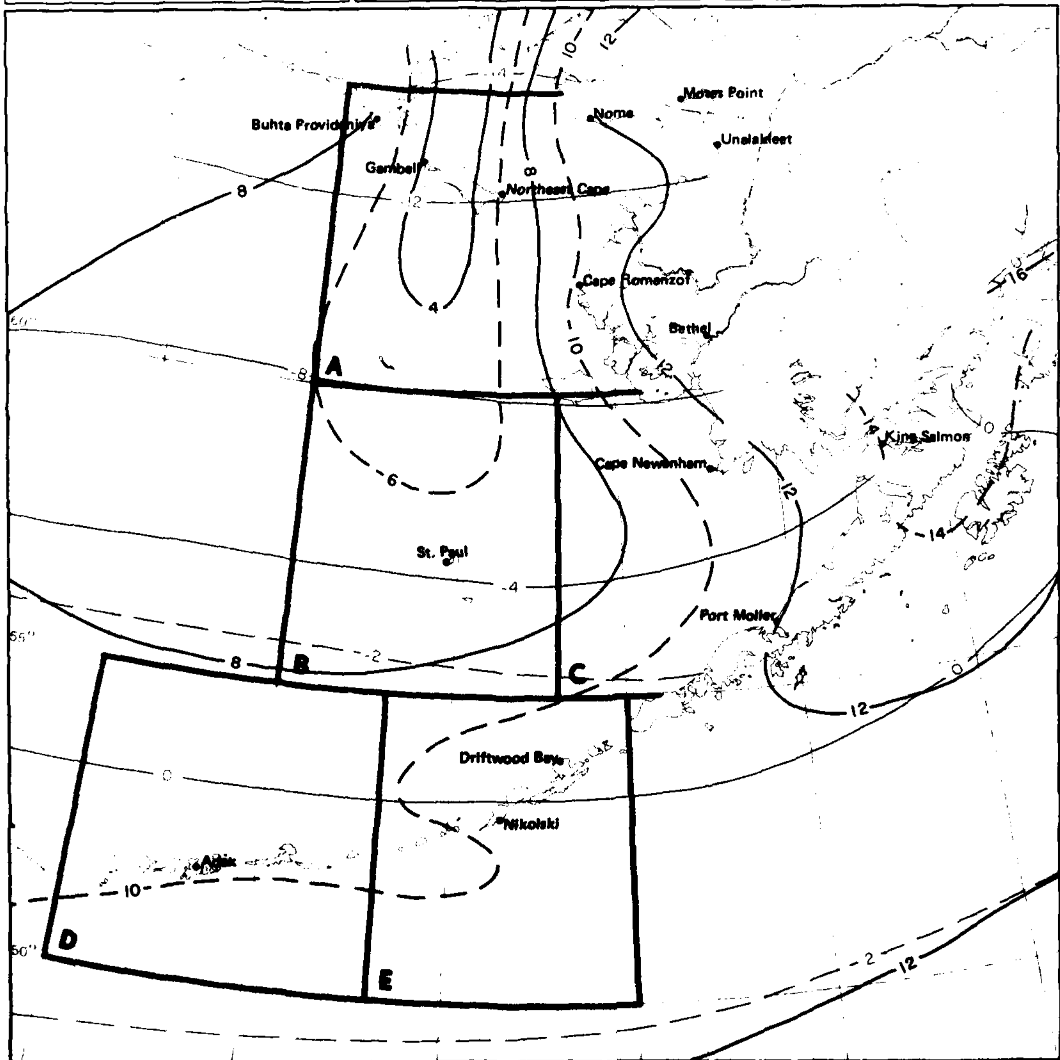
Marine Area B

[illegible]

Marine Area C

TEMP (°C)	0-3	4-10	11-21	22-33	≥34
2,3	[illegible]	11	14	4	+
0,1	[illegible]	[illegible]	9	4	+

6915



5 Air temperature extremes (°C)

Marine Area D

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥34
14,15	+	+	+	0	0
12,13	+	+	+	0	+
10,11	+	1	1	+	+
8,9	1	3	3	1	+
6,7	1	8	12	4	1
4,5	2	12	21	9	2
2,3	1	4	5	4	1
0,1	+	+	1	+	+
-2,-1	0	+	+	+	0
-4,-3	0	+	+	+	+
-6,-5	0	0	0	0	0

5286

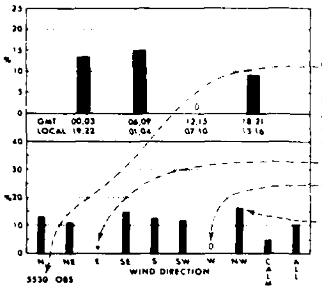
Marine Area E

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥34
16,17	+	+	+	0	0
14,15	+	+	+	0	+
12,13	+	+	+	+	+
10,11	+	1	1	+	+
8,9	1	3	3	1	+
6,7	2	9	12	4	1
4,5	2	11	18	8	2
2,3	1	4	7	3	1
0,1	+	1	1	1	+
-2,-1	+	+	+	+	+
-4,-3	0	+	+	+	+

6179

Legend Fog/time and fog/wind direction



- Number of observations
- Bar graphs represent percent frequency of Fog (without precipitation) for various hour groupings and wind directions. Data are based on 100% for each hour group and direction category
- * indicates < 0.5% but > 0
- 0 indicates no fog occurred with the wind direction
- (Data show that 17% of all NW winds were accompanied by Fog (without precipitation))

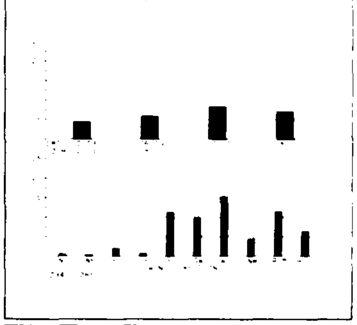
Map - Fog

BLACK LINE Percent frequency of occurrence of all fog

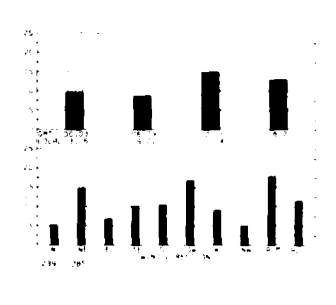
BLUE LINE Percent frequency of fog occurring without precipitation

The percent frequency of observations reporting fog with precipitation for a given point can be determined by computing the difference between the two analyses

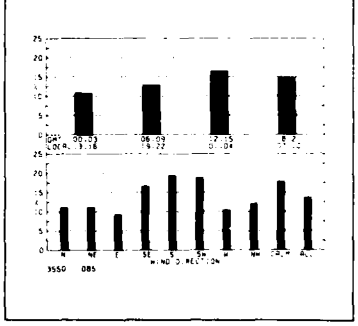
Buhta Provideniya



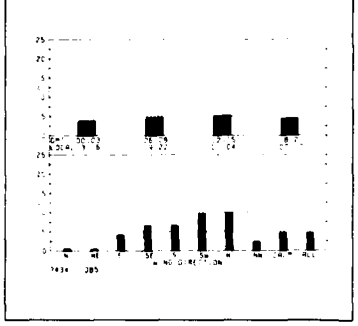
Gambell



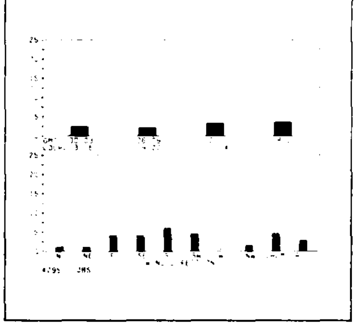
Northeast Cape



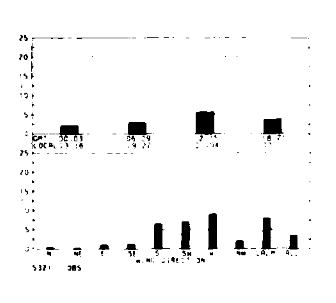
Nome



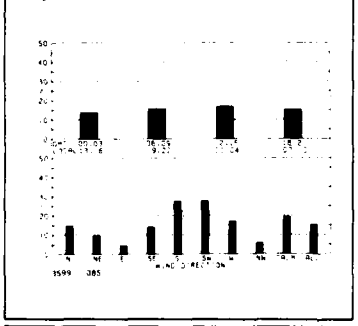
Moses Point



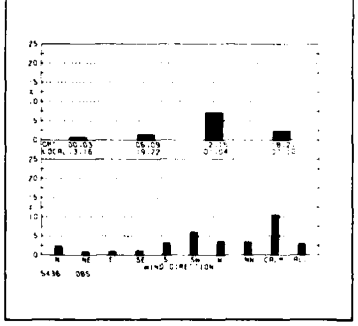
Unalakleet



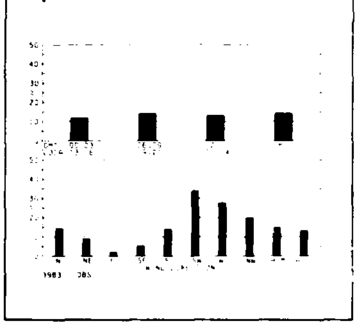
Cape Romanzof



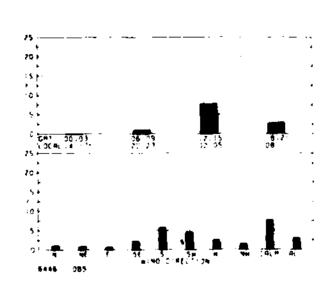
Bethel



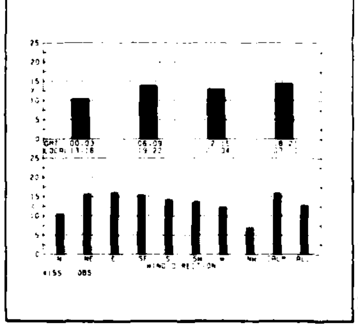
Cape Newenham



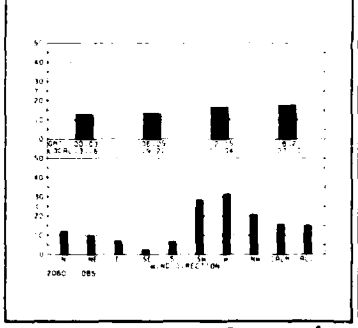
King Salmon



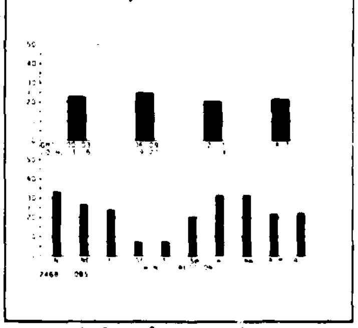
St. Paul

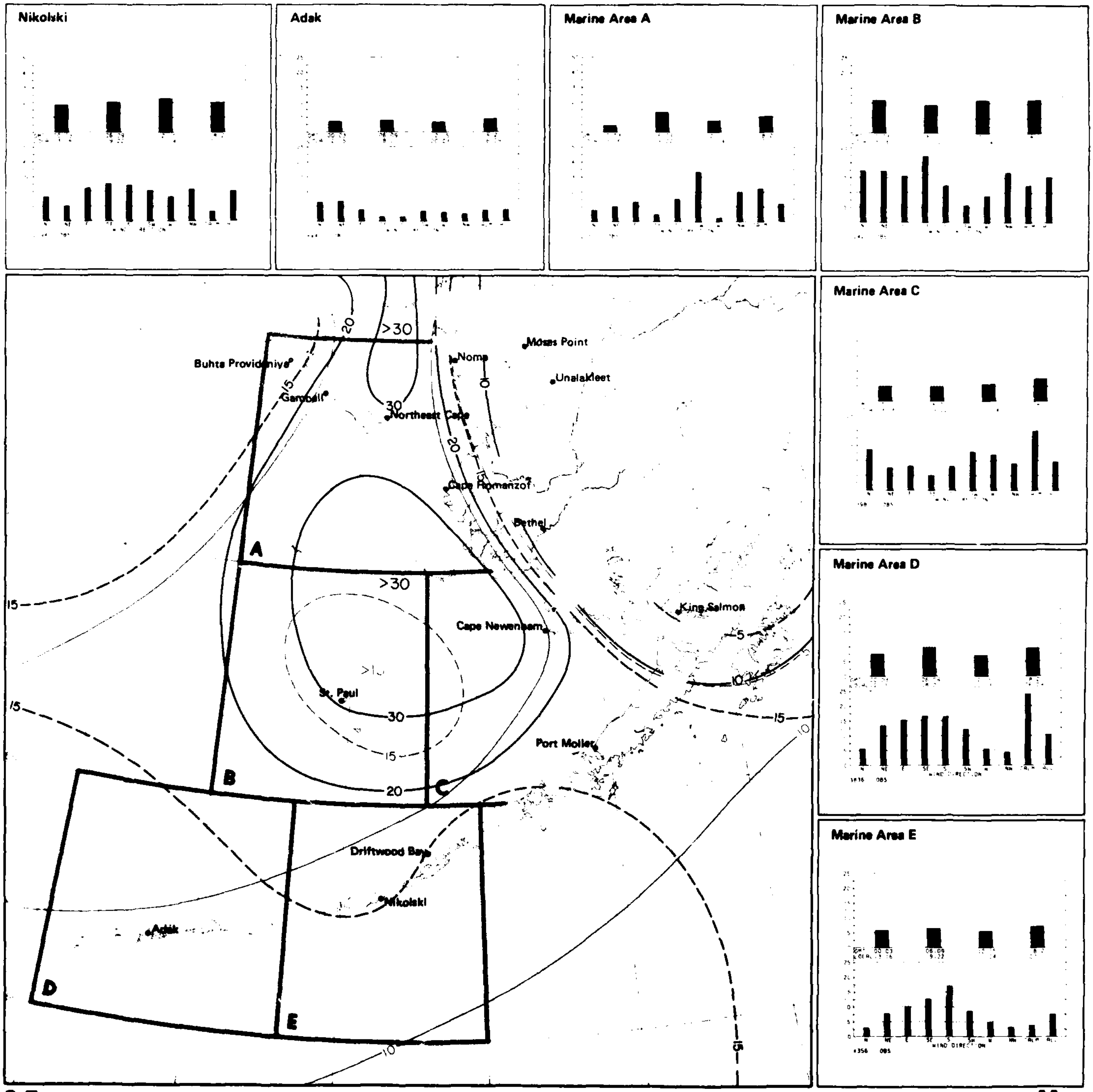


Port Moller



Driftwood Bay

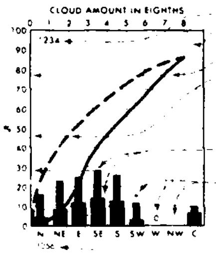



Nikolski
Adak
Marine Area A
Marine Area B
Marine Area C
Marine Area D
Marine Area E
Buhta Providniya
Gambell
Northeast Cape
Nome
Moses Point
Unalakleet
Cape Romanzof
Bethel
King Salmon
Cape Newenham
St. Paul
Port Moller
Driftwood Bay
Nikolski
Adak
>30
30
20
15
10
5
A
B
C
D
E

6 Fog **May**

Legend

Cloud cover/wind direction



Cumulative percent frequency of indicated cloud amount equal to or less than the amount intersected by the curve

Number of total cloud observations

Obscurations

77% of all total cloud amounts were ≤7 8

46% of all low cloud amounts were ≤2 8

Low cloud amount Percent frequency of observations from each direction and calm that were accompanied by low cloud amounts ≥5 8 and ≥7 8 Low clouds are clouds with bases <8000 feet

28% of all SE winds were accompanied by low cloud amounts ≥5 8 and 14% by low cloud amounts ≥7 8

An asterisk indicates that the percentage is based on 10 30 observations of wind direction total and low cloud amount 0 replaces bar graph when no low cloud amounts ≥5 8 were observed with a wind direction or calm 0 or bar is omitted when number of observations of total and low cloud amount from a wind direction or calm is less than 10

Number of low cloud observations

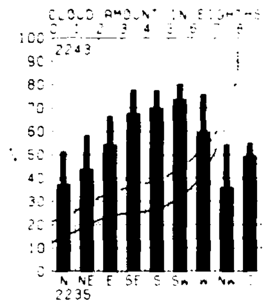
Map · Cloud amount thresholds

BLACK LINE Percent frequency of total cloud amount ≤2 8

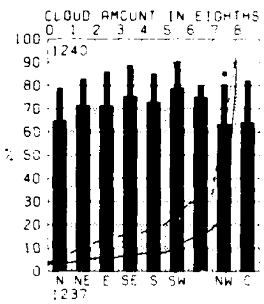
BLUE LINE Percent frequency of low cloud amount ≥5 8

Since the number of observations reporting low cloud amount is usually less than that for total cloud amount somewhat different samples may be used to compute the two curves on the graph This may lead to inconsistencies where low cloud amount appears higher than the total cloud amount Where this occurred the graph was adjusted in favor of the total cloud by making the curves coincide The frequency of obscured conditions may be determined by subtracting the cumulative percent frequency corresponding to 8 8 coverage from 100% In computing the bar graph obscurations are considered as 8 8 coverage

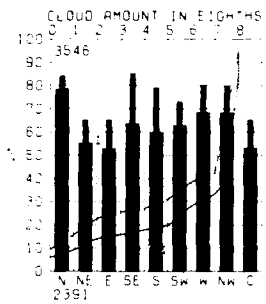
Buhta Provideniya



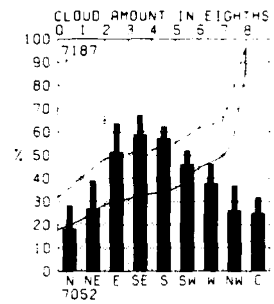
Gambell



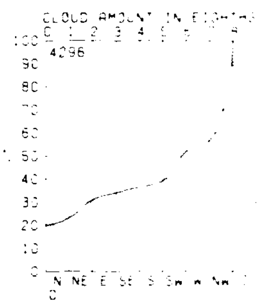
Northeast Cape



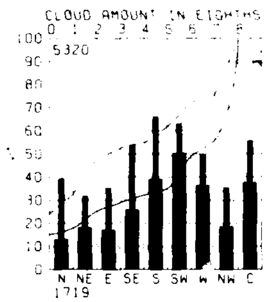
Nome



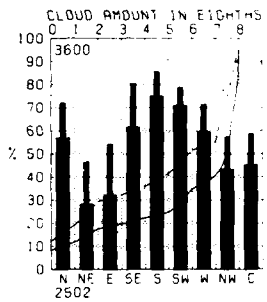
Moses Point



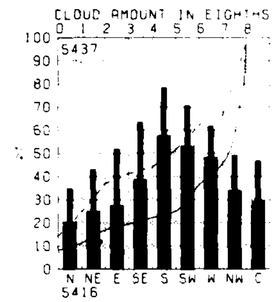
Unalakleet



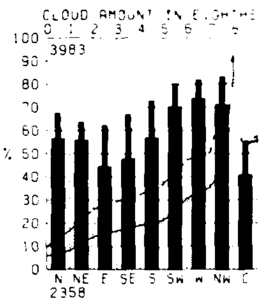
Cape Romanzof



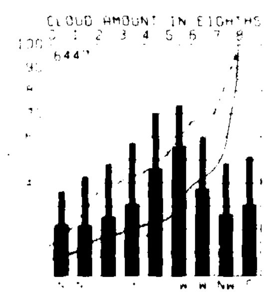
Bethel



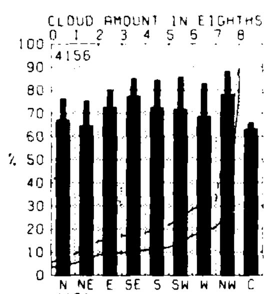
Cape Newenham



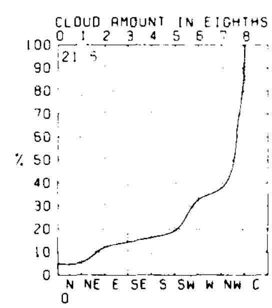
King Salmon



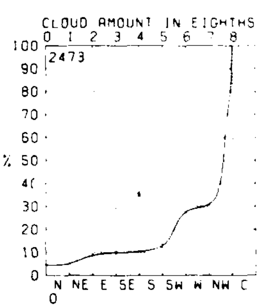
St. Paul

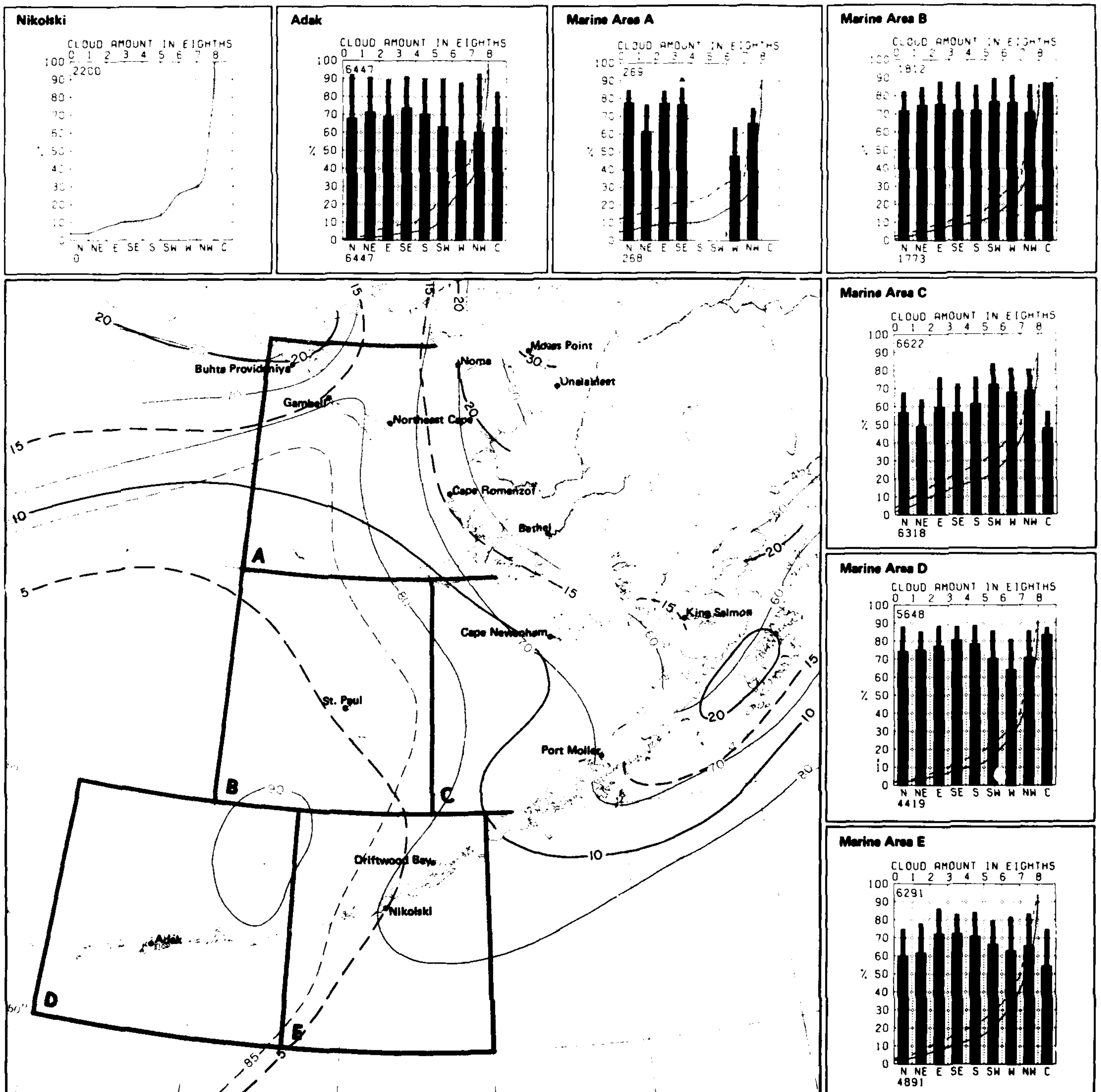


Port Moller



Driftwood Bay



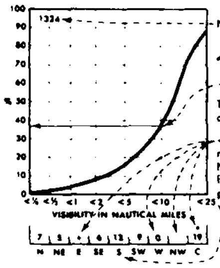


7 Cloud amount thresholds

May

Legend

Visibility/wind direction



- Number of observations
- Cumulative percent frequency of visibilities less than the visibility intersected by the curve
- (37% of all visibilities reported were <10 nautical miles.)

The table below the graph indicates percent frequency of occurrence of visibility <2 nautical miles versus wind direction

• indicates < 5% but >0 0 indicates that no visibilities <2 nautical miles were observed with winds from a direction or calm. No percentage is given if less than 10 observations were available for visibility and wind direction. An asterisk indicates that the percentage was based on 10-30 observations of visibility and wind direction

- (13% of all S winds were accompanied by visibilities <2 nautical miles.)

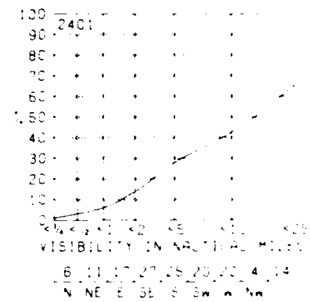
Map - Visibility thresholds

BLACK LINE Percent frequency of visibilities ≥5 nautical miles

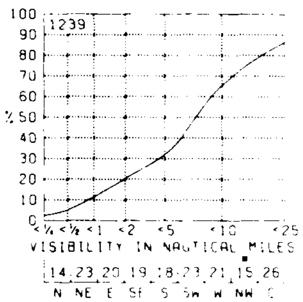
BLUE LINE Percent frequency of visibilities <2 nautical miles

The percentage of visibility equal to or greater than a given value can be obtained from the graph by subtracting the cumulative percent frequency of that value from 100%. Visibility at sea is difficult to measure because of the lack of reference points. Also, some observers seem to report reduced visibilities at night because of darkness, though this tendency has abated in recent years. The coarseness of the coding intervals, however, tends to minimize serious biases in the summarized data. Visibilities greater than 25 nmi should be interpreted cautiously because the earth's curvature makes it impossible to see 25 nmi horizontally from the bridges of most ships

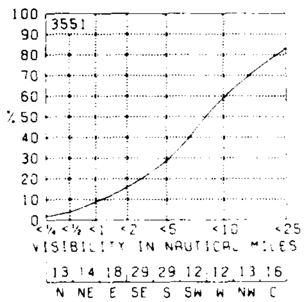
Buhta Providenlya



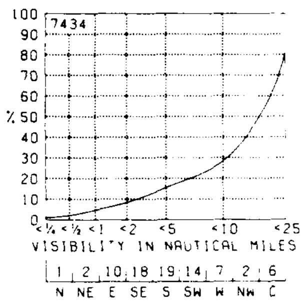
Gambell



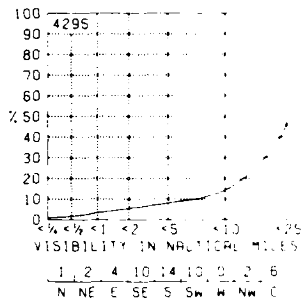
Northeast Cape



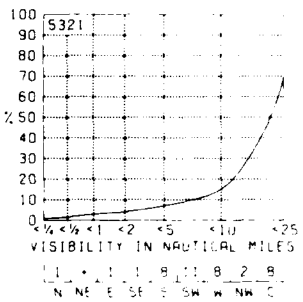
Nome



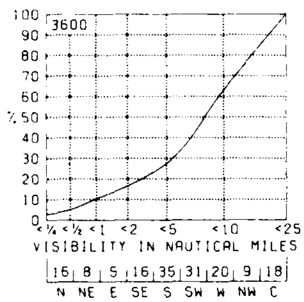
Moses Point



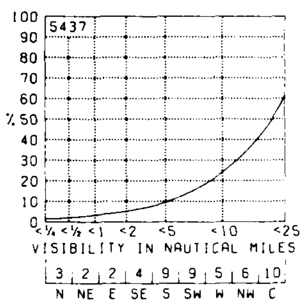
Unalakleet



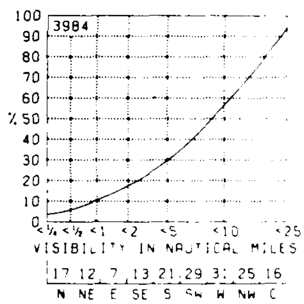
Cape Romanzof



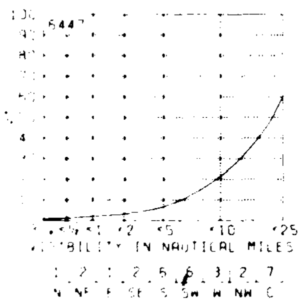
Bethel



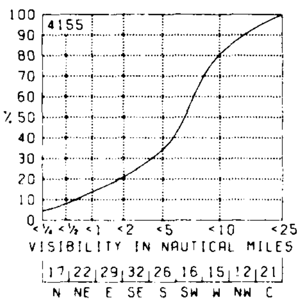
Cape Newenham



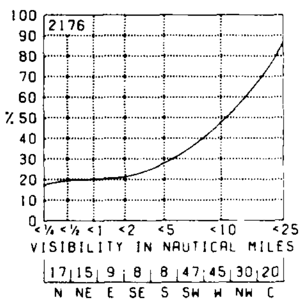
King Salmon



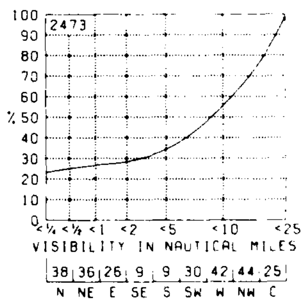
St. Paul

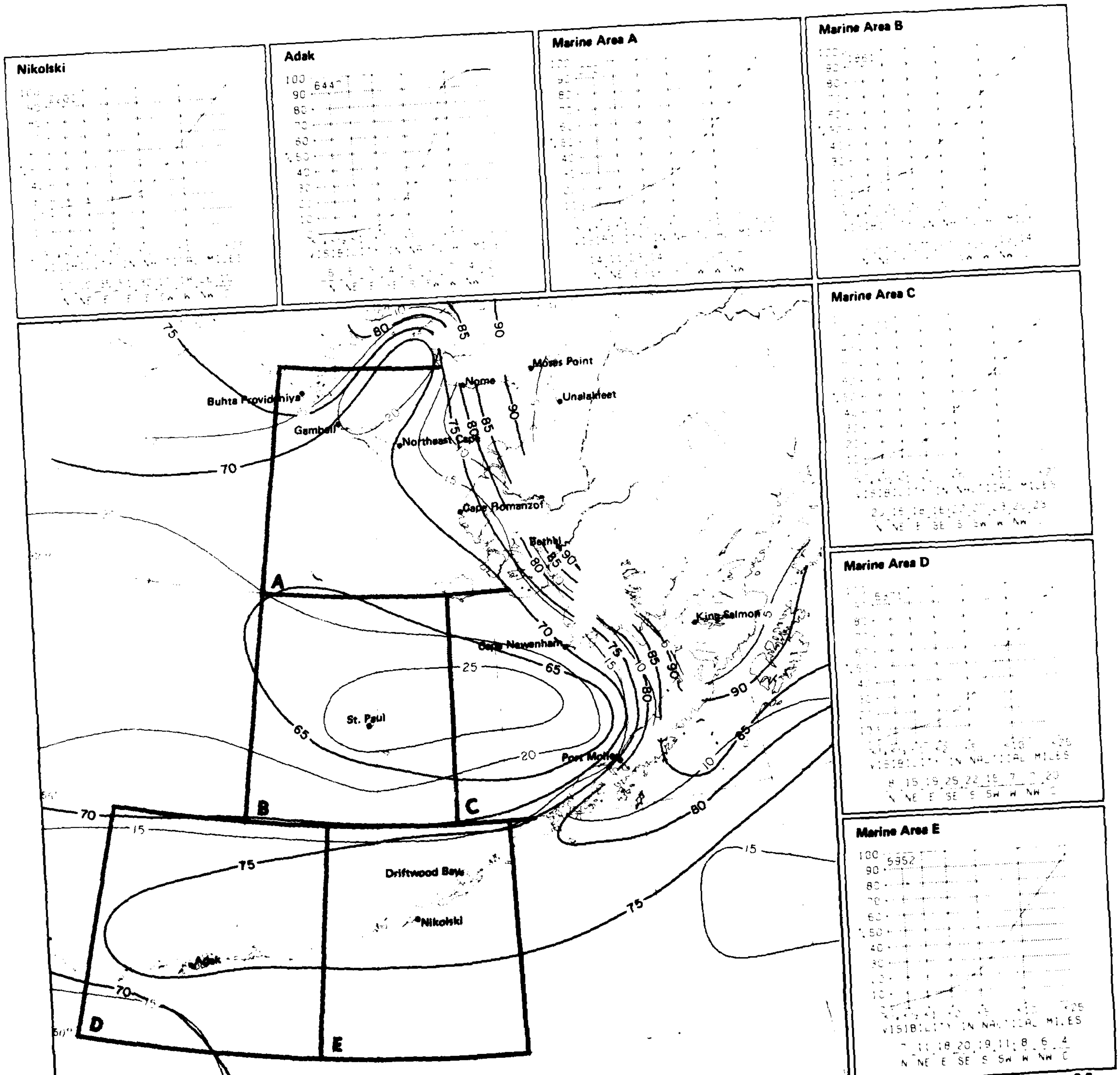


Port Moller



Driftwood Bay



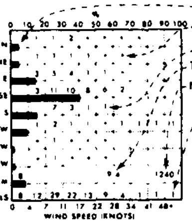


8 Visibility thresholds

Legend

Wind speed/direction

Direction frequency (top scale) Bars represent percent frequency of winds observed from each direction Speed frequency (bottom scale) Printed figures represent percent frequency of wind speeds observed from each direction



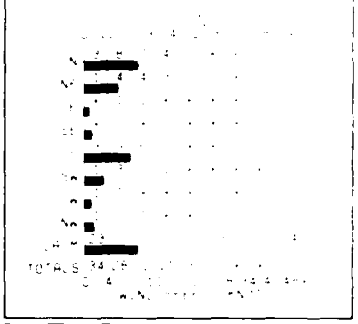
Map - Wind speed thresholds

BLACK LINE Percent frequency of wind speed ≤10 knots (≤12 mph)

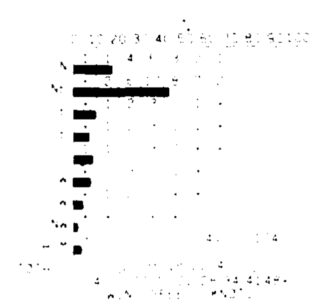
BLUE LINE Percent frequency of wind speed ≥34 knots (≥39 mph)

The scalar mean wind speed on the graph is based on the number of observations reporting a wind speed with direction The sum of the totals line provides the cumulative percent frequency of wind speed below a selected threshold value In the example graph, 71% of all winds were less than 17 knots (20 mph)

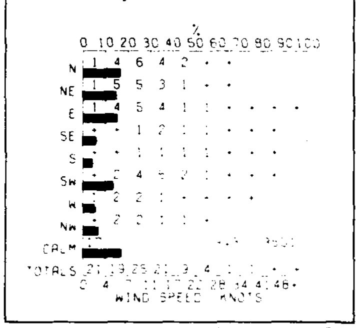
Buhta Provideniya



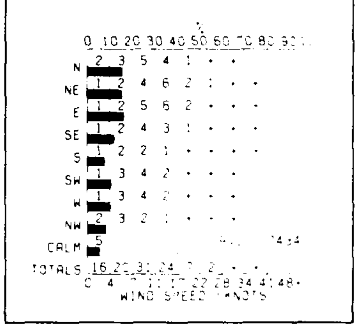
Gambell



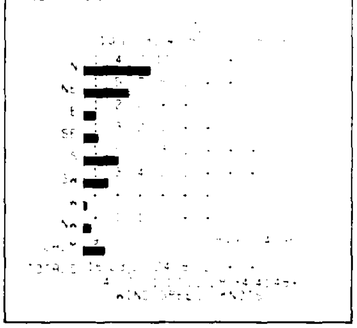
Northeast Cape



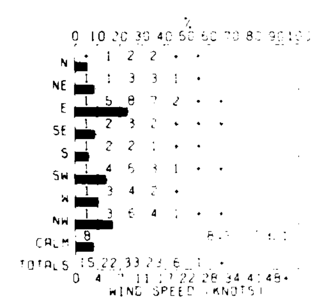
Nome



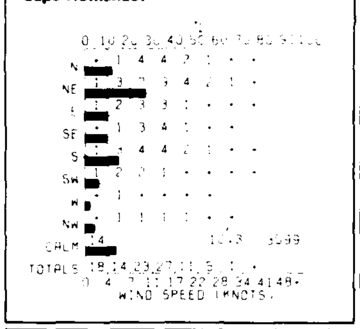
Moses Point



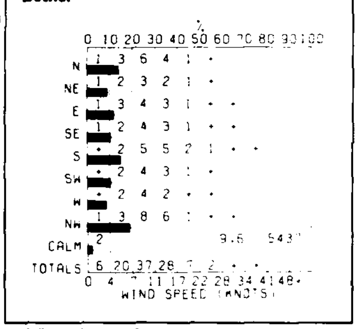
Unalakleet



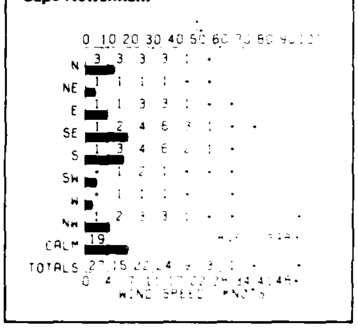
Cape Romanzof



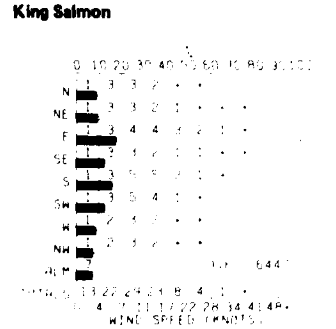
Bethel



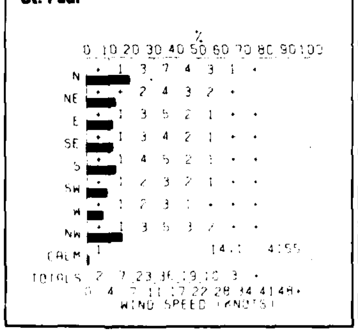
Cape Newenham



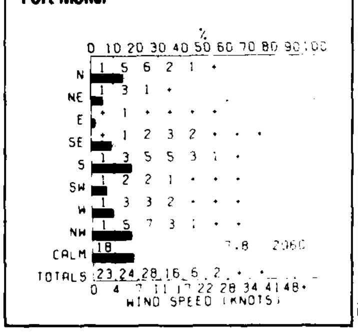
King Salmon



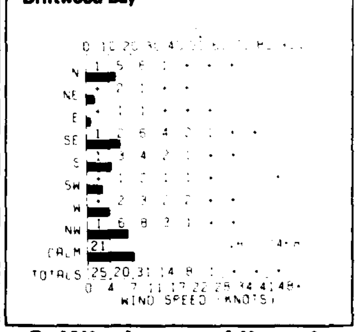
St. Paul

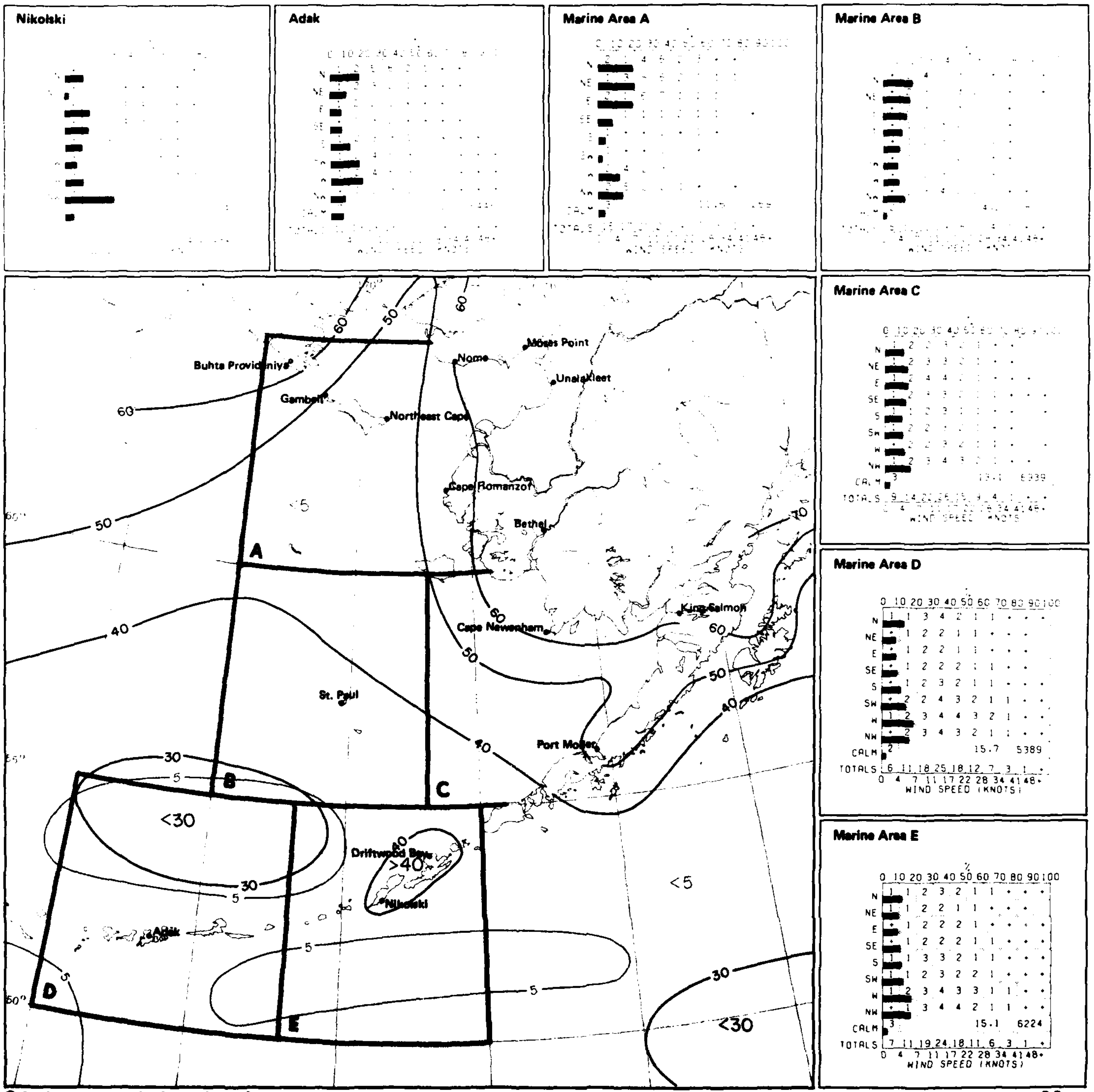


Port Moller



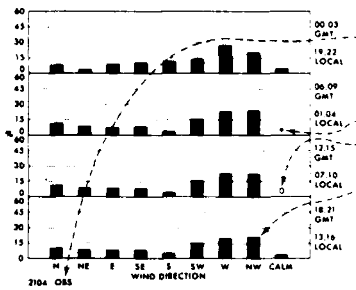
Driftwood Bay





9 Wind speed thresholds **May**

Legend — Wind direction/diurnal variation



Number of observations

Bars show percent frequency of wind direction (8 pts) by hour (GMT and Local Time). Data are based on 100% for each hour group

* indicates < 0.5% but > 0

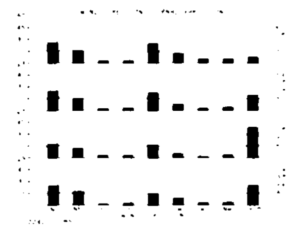
0 indicates no observations in the category

(22% of the wind observations for the hours 18 and 21 GMT (13 and 16 Local Time) had a direction from the northwest)

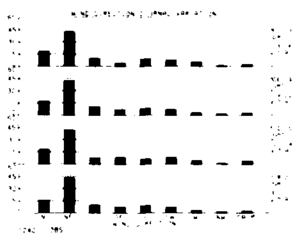
Map · Vector mean wind

10.2 Direction of flow toward station dot; vector magnitude in knots (example: vector mean wind is from northeast at 10.2 knots or 11.7 mph)

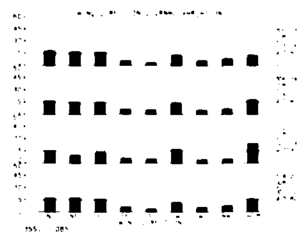
Buhta Provideniya



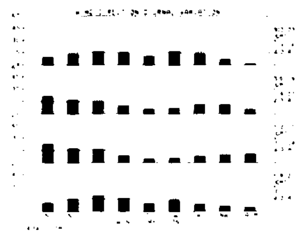
Gambell



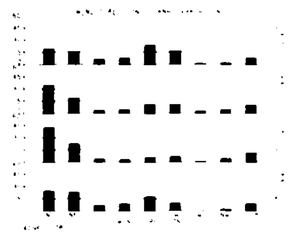
Northeast Cape



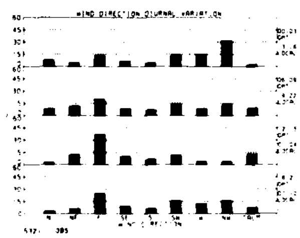
Nome



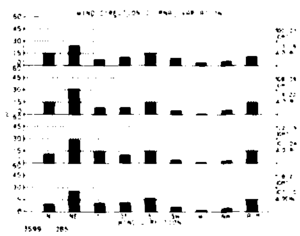
Moses Point



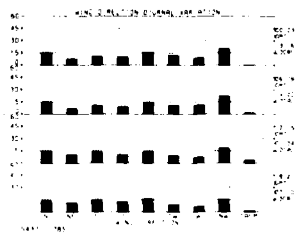
Unalakleet



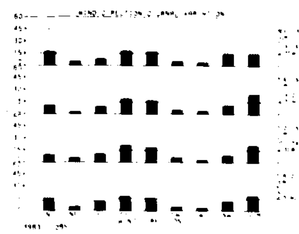
Cape Romanzof



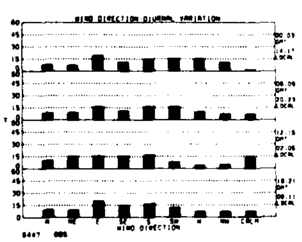
Bethel



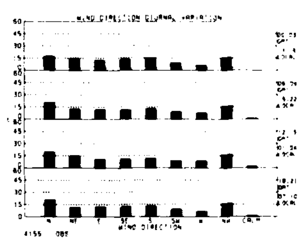
Cape Newenham



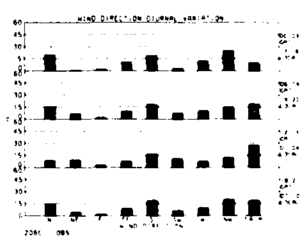
King Salmon



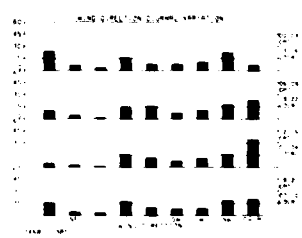
St. Paul

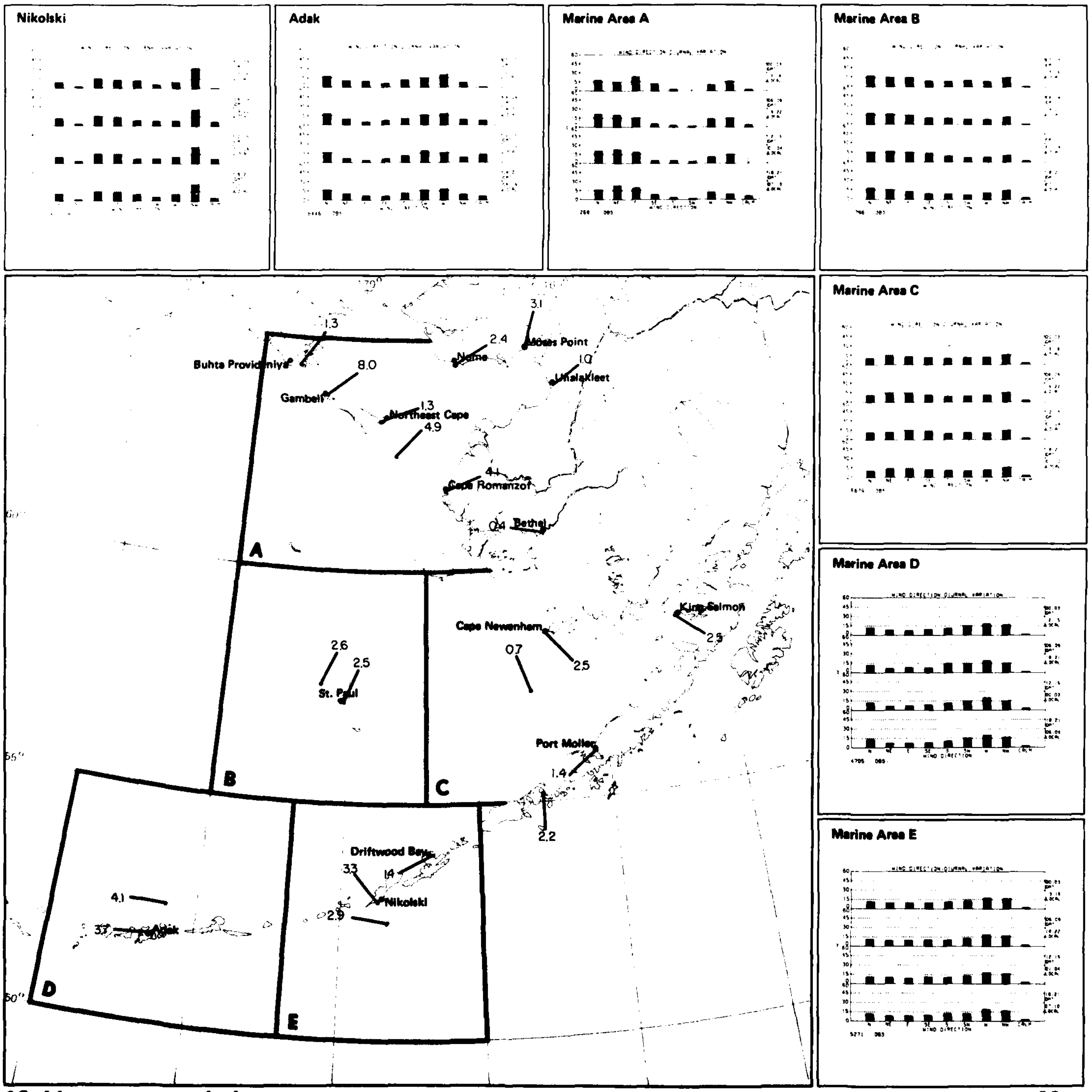


Port Moller



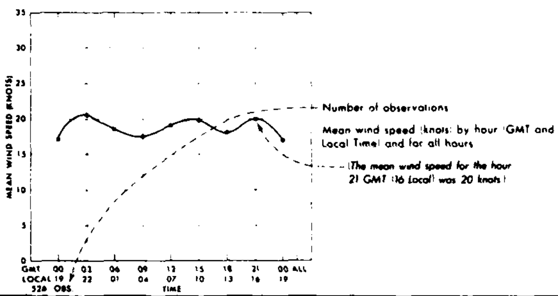
Driftwood Bay





10 Vector mean wind **May**

Legend **Wind speed/diurnal variation**

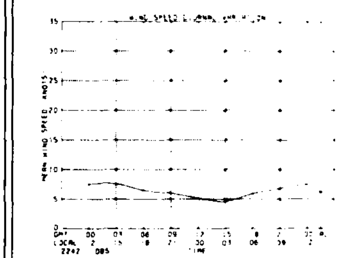


Map - Scalar mean wind

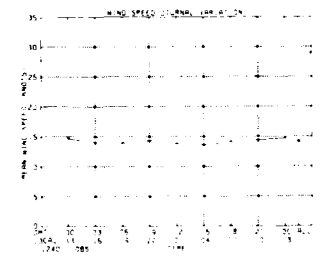
BLACK LINE Scalar mean wind (knots)

In areas of high persistence of direction, the magnitude of the vector mean winds should closely approach that of the scalar mean winds. As most of the marine observations are recorded at six hour intervals, disregard the plots for other than 00, 06, 12, 18, GMT hours on the marine area graphs.

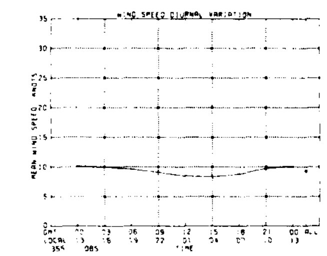
Buhta Provideniya



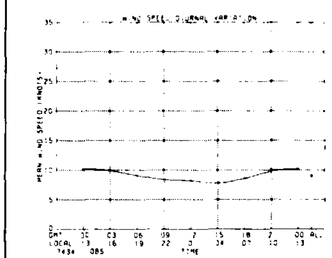
Gambell



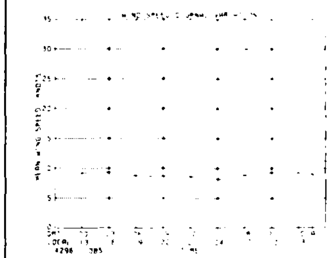
Northeast Cape



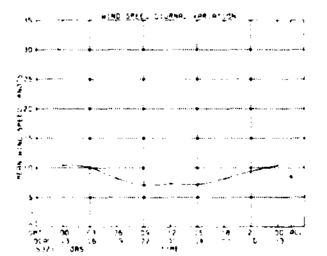
Nome



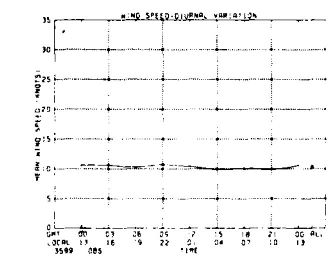
Moses Point



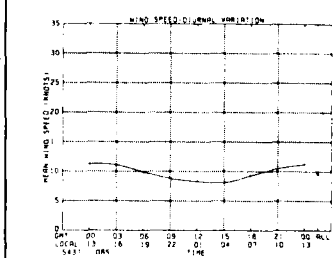
Unalakleet



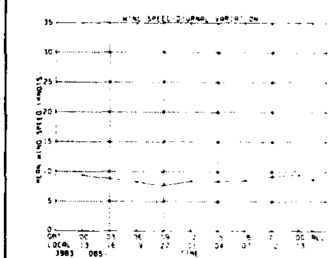
Cape Romanzof



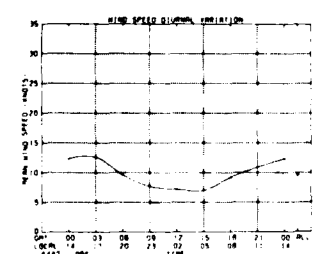
Bethel



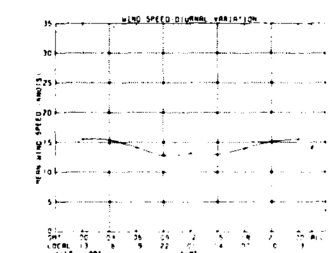
Cape Newenham



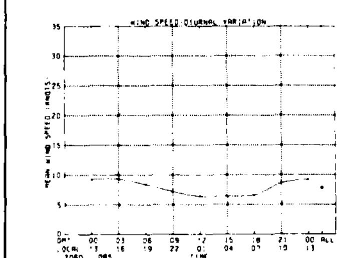
King Salmon



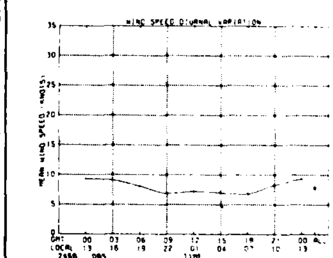
St. Paul

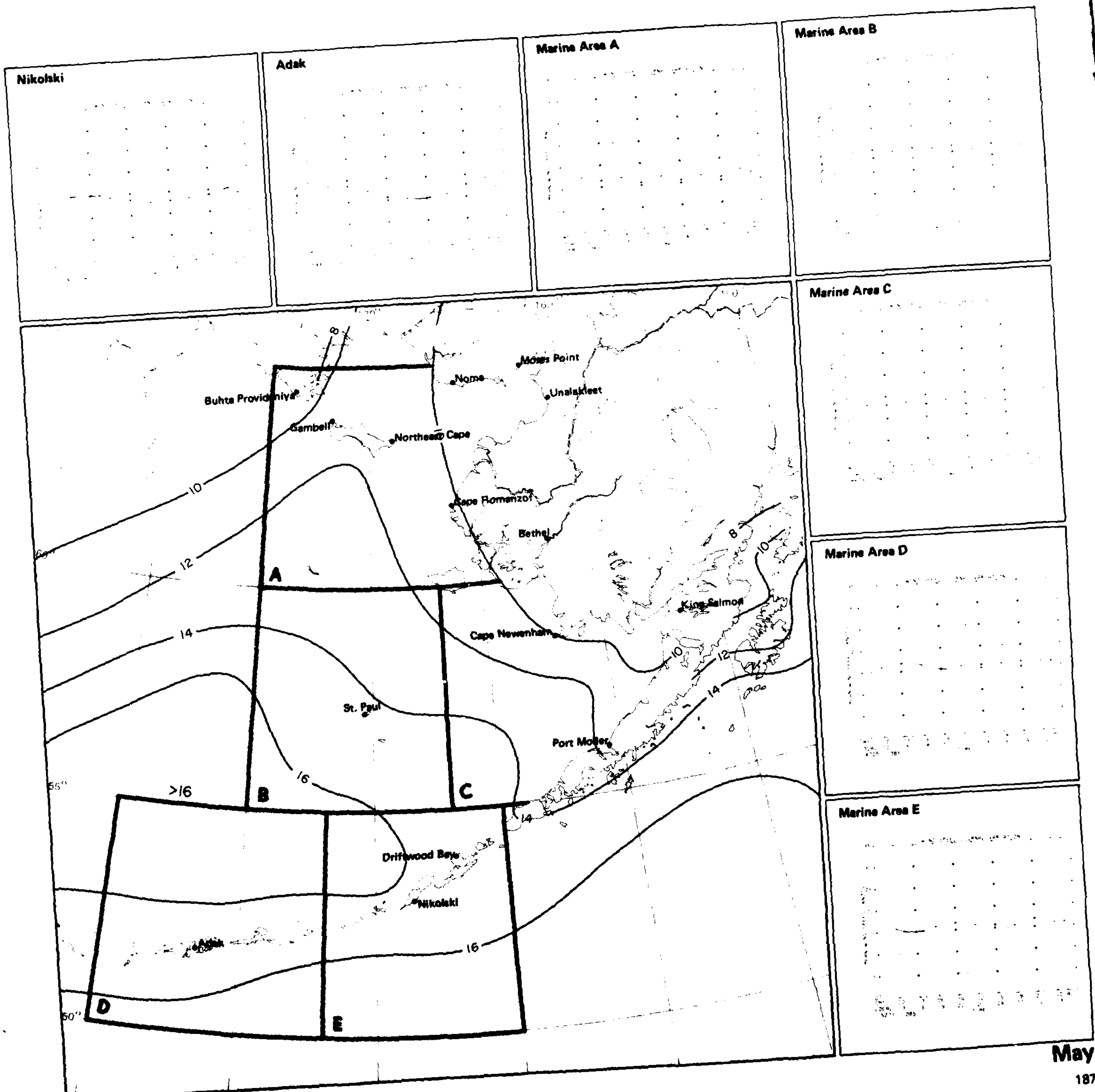


Port Moller



Driftwood Bay





May

11 Scalar mean wind

Legend

Low cloud ceiling/visibility

VISIBILITY

LOW CLOUD CEILING	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	0	0	+	3	13	64
50<80	0	0	0	0	+	1
35<50	0	+	0	0	0	4
20<35	0	+	1	1	2	2
10<20	0	+	1	1	2	1
6<10	0	1	0	+	+	0
3<6	+	+	0	+	+	0
1.5<3	+	0	0	0	0	0
0<1.5	+	0	0	0	0	0
						334

Percent frequency of simultaneous occurrence of specified low cloud ceilings (hundreds of feet) and visibilities (nautical miles)

Low cloud ceiling heights are estimated from the height of low clouds (h) when low cloud amount (Nh) is ≥5 8

Obscurations are included under ceiling 0 <1.5

N C (no ceiling) includes bases of clouds ≥8000 feet as well as occurrences of N_h <5 8

(2% of all observations reported ceiling ≥1000 but <2000 feet simultaneously with visibility ≥5 but <10 nautical miles)

+ indicates < 5% but >0

Number of observations

Map - Low cloud ceiling and visibility thresholds

BLACK LINE Percent frequency of low cloud ceiling ≥1000 feet (or no low cloud ceiling) and visibility ≥5 nautical miles

BLUE LINE Percent frequency of low cloud ceiling <600 feet and/or visibility <2 nautical miles

Buhta Provideniya

Gambell

VISIBILITY

LOW CLOUD CEILING	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	+	0	+	+	4	13
50<80	0	0	0	+	+	1
35<50	+	0	0	+	+	+
20<35	+	0	+	+	1	3
10<20	0	+	1	2	8	8
6<10	+	1	3	4	14	9
3<6	+	1	2	4	4	1
1.5<3	+	+	1	+	+	0
0<1.5	4	3	1	+	0	0
						1236

Northeast Cape

VISIBILITY

LOW CLOUD CEILING	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	+	+	+	1	4	22
50<80	0	0	0	+	+	1
35<50	0	0	+	+	+	1
20<35	+	+	+	+	2	4
10<20	+	+	1	3	9	12
6<10	0	1	2	3	8	6
3<6	+	1	2	3	3	1
1.5<3	0	0	+	+	+	0
0<1.5	3	2	1	1	0	0
						2391

Nome

VISIBILITY

LOW CLOUD CEILING	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	+	+	+	+	1	54
50<80	0	+	0	0	+	4
35<50	0	+	0	+	+	3
20<35	+	+	0	+	2	5
10<20	+	+	+	1	4	4
6<10	+	+	1	2	3	1
3<6	+	1	1	2	2	+
1.5<3	+	+	+	+	+	+
0<1.5	2	1	1	+	+	0
						7052

Moses Point

VISIBILITY

LOW CLOUD CEILING	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	+	0	+	+	1	48
50<80	0	0	0	1	+	9
35<50	+	0	0	0	+	6
20<35	+	0	0	0	3	7
10<20	0	0	0	1	4	7
6<10	0	0	+	1	0	0
3<6	0	0	0	+	+	0
1.5<3	0	0	0	0	0	0
0<1.5	5	2	1	+	0	0
						244

Unalakleet

Cape Romanzof

VISIBILITY

LOW CLOUD CEILING	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	+	+	+	1	16	21
50<80	0	+	+	+	2	1
35<50	0	0	0	+	1	1
20<35	+	+	+	1	6	4
10<20	+	+	1	2	8	3
6<10	+	1	2	4	5	2
3<6	+	2	2	3	3	+
1.5<3	+	+	+	+	+	+
0<1.5	4	2	1	+	0	0
						2502

Bethel

VISIBILITY

LOW CLOUD CEILING	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	+	+	+	+	3	43
50<80	0	+	0	+	+	5
35<50	+	0	0	+	1	6
20<35	+	+	+	+	2	11
10<20	+	+	+	1	4	8
6<10	+	+	+	1	4	2
3<6	+	+	1	1	2	1
1.5<3	0	+	+	+	0	+
0<1.5	2	1	+	+	+	0
						5416

Cape Newenham

VISIBILITY

LOW CLOUD CEILING	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	+	+	+	1	14	19
50<80	+	+	+	0	1	1
35<50	0	0	0	0	+	1
20<35	+	0	0	+	2	4
10<20	0	+	1	2	5	7
6<10	0	+	2	5	7	5
3<6	0	+	2	4	3	1
1.5<3	+	+	+	+	+	+
0<1.5	5	3	2	1	+	0
						2358

King Salmon

VISIBILITY

LOW CLOUD CEILING	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	+	+	+	+	2	45
50<80	0	0	0	+	1	6
35<50	0	0	0	0	1	8
20<35	0	+	+	+	3	13
10<20	+	+	+	1	4	6
6<10	+	+	+	1	3	1
3<6	+	+	+	1	1	+
1.5<3	0	+	+	+	+	+
0<1.5	1	1	+	+	+	+
						6363

St. Paul

VISIBILITY

LOW CLOUD CEILING	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	+	+	+	1	11	8
50<80	+	0	0	0	+	+
35<50	+	0	0	+	1	1
20<35	+	+	+	+	7	4
10<20	+	+	1	3	15	5
6<10	+	+	1	3	5	1
3<6	1	2	4	6	6	1
1.5<3	+	1	1	1	+	+
0<1.5	7	3	1	+	+	0
						4131

Port Moller

Insufficient Data

Driftwood Bay

Insufficient Data

Nikolski

Insufficient Data

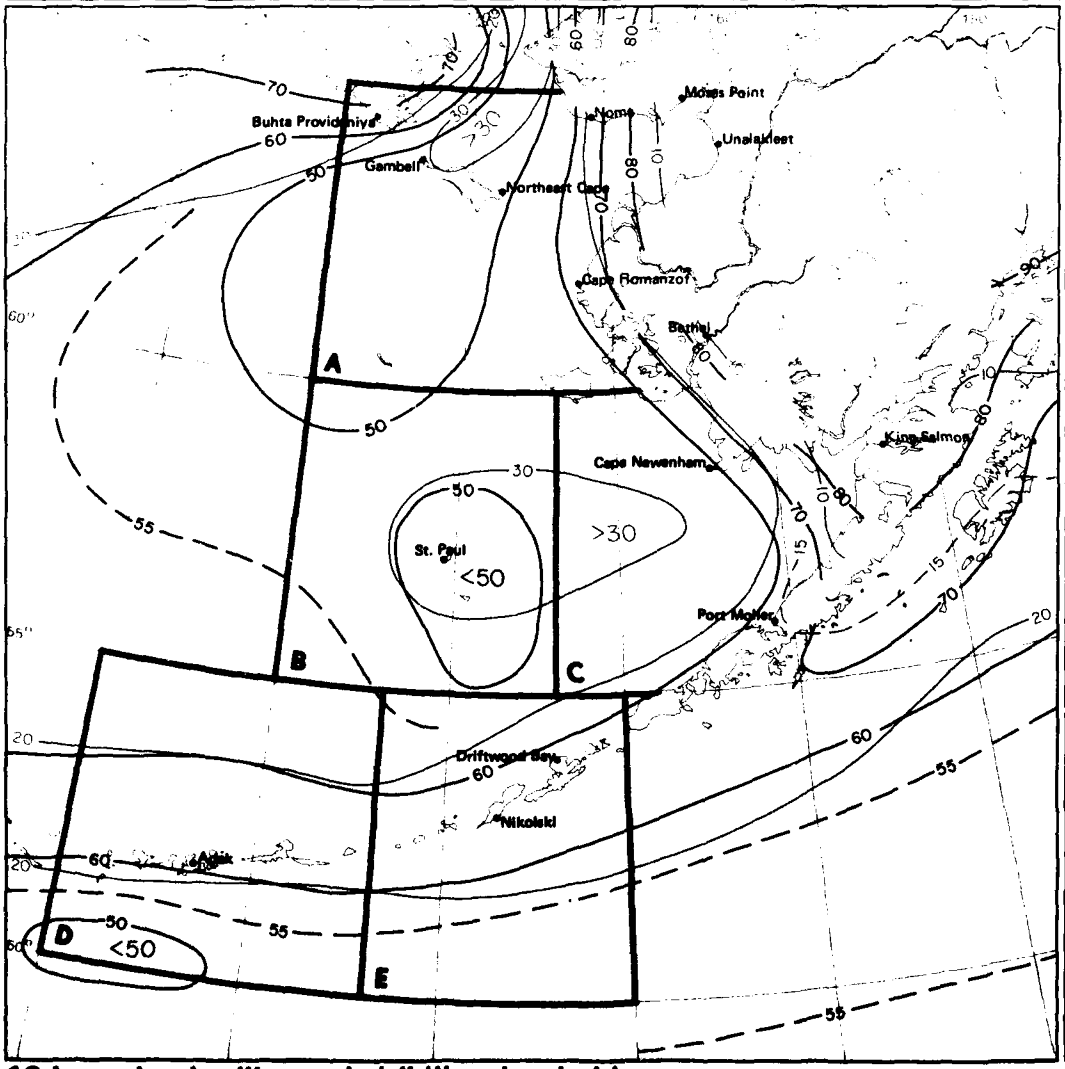
Adak

LOW CLOUD CEILING	VISIBILITY <1/2	1/2<1	1<2	2<5	5<10	≥10
NC	•	[illegible]	•	•	[illegible]	3
50<80	0	[illegible]	0	0	•	•
35<50	0	0	0	0	3	1
20<35	0	•	•	1	21	2
10<20	•	•	1	9	31	1
6<10	0	•	1	8	6	•
3<6	0	•	1	2	2	•
1.5<3	•	•	•	•	•	0
0<1.5	•	•	1	•	•	0

6446

Marine Area A

Marine Area B



Marine Area C

Marine Area D

Marine Area E

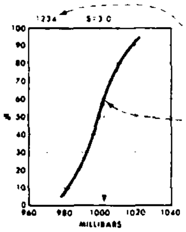
LOW CLOUD CEILING	VISIBILITY <1/2	1/2<1	1<2	2<5	5<10	≥10
NC	•	•	•	[illegible]	4	4
50<80	[illegible]	[illegible]	•	•	[illegible]	[illegible]
35<50	•	[illegible]	•	•	1	[illegible]
20<35	•	•	•	[illegible]	5	[illegible]
10<20	•	•	[illegible]	[illegible]	[illegible]	[illegible]
6<10	•	[illegible]	[illegible]	•	[illegible]	[illegible]
3<6	•	•	•	[illegible]	2	[illegible]
1.5<3	•	•	•	•	•	•
0<1.5	4	[illegible]	[illegible]	[illegible]	1	•

4446

12 Low cloud ceiling and visibility thresholds **May**

Legend

Sea level pressure



Number of observations

Cumulative percent frequency of sea level pressures equal to or less than the pressure intersected by the curve

S Standard deviation of pressure mbs

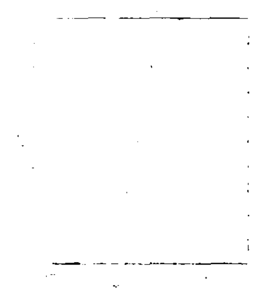
60% of all observed sea level pressures were ≤1002 millibars

Map - Mean sea level pressure

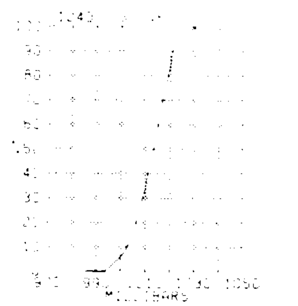
BLACK LINE Mean sea level pressure millibars

Sea level pressure is one of the most frequently recorded elements but one of the least accurate because of instrument and coding errors. Despite the inaccuracies of the individual readings, however, the large scale patterns and mean gradients of the isopleth analyses are relatively accurate.

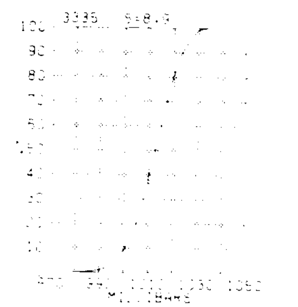
Buhta Provideniya



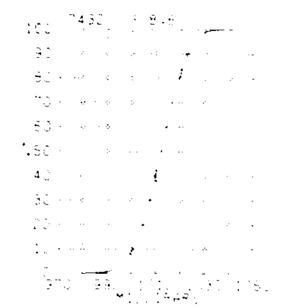
Gambell



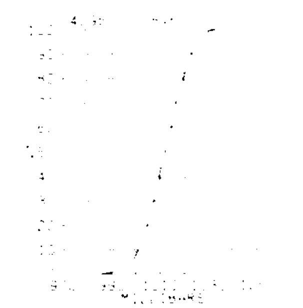
Northeast Cape



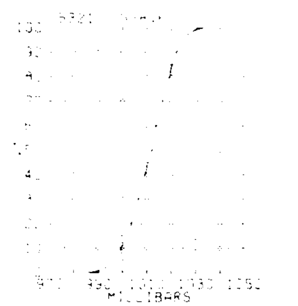
Nome



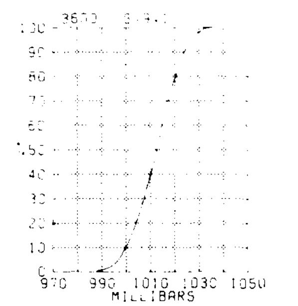
Moses Point



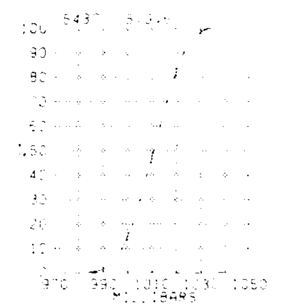
Unalakleet



Cape Romanzof

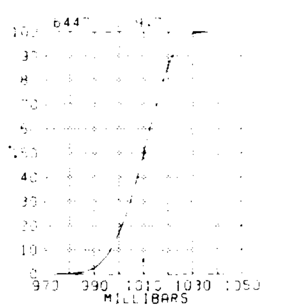


Bethel

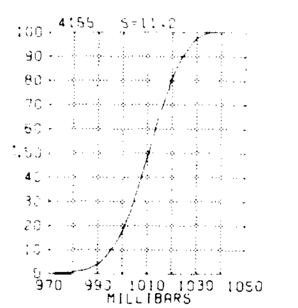


Cape Newenham

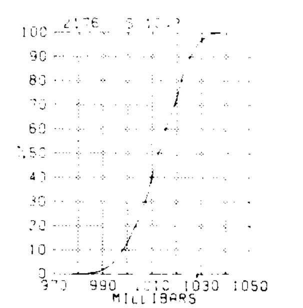
King Salmon



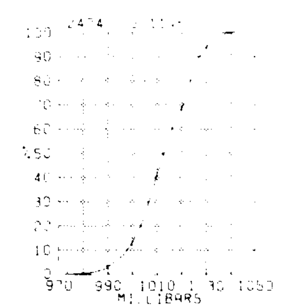
St. Paul

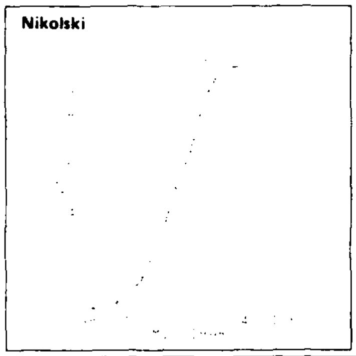


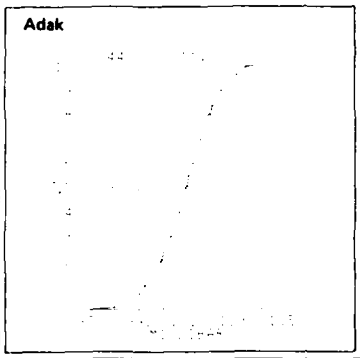
Port Moller

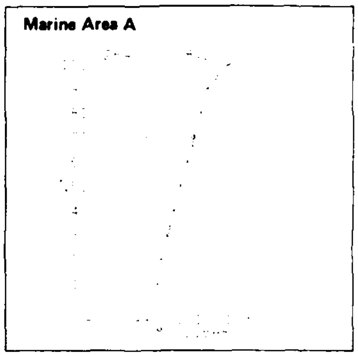


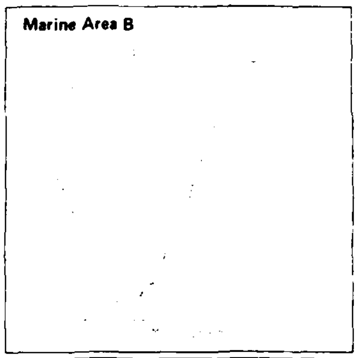
Driftwood Bay

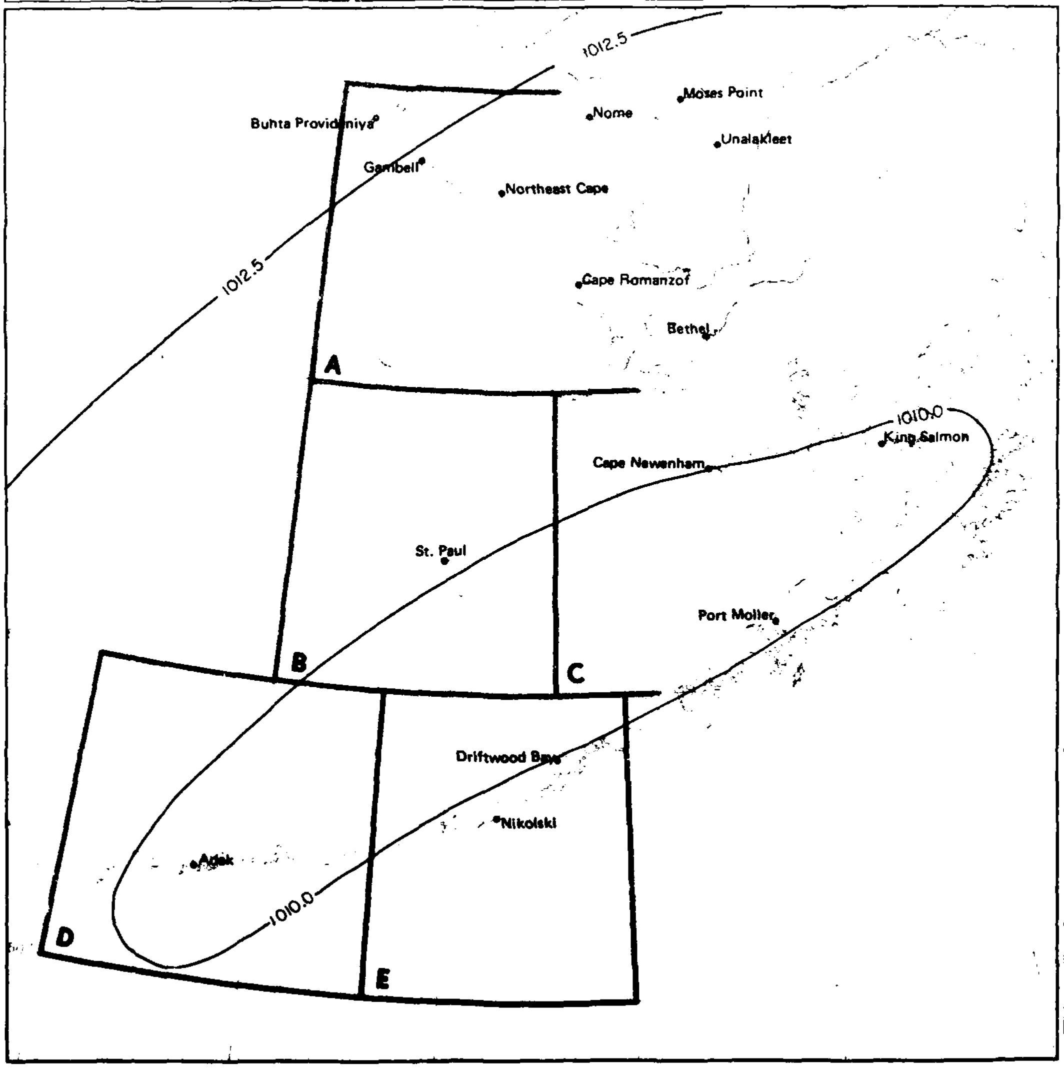


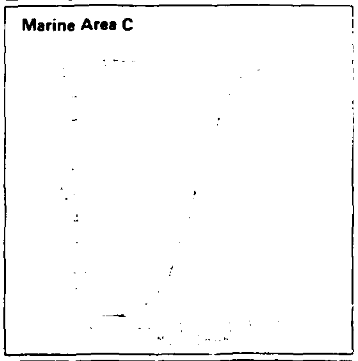


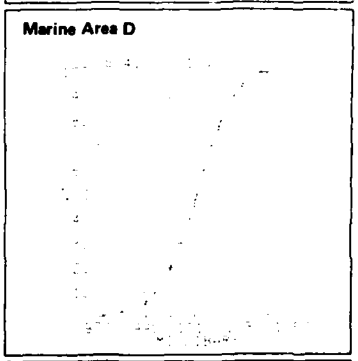


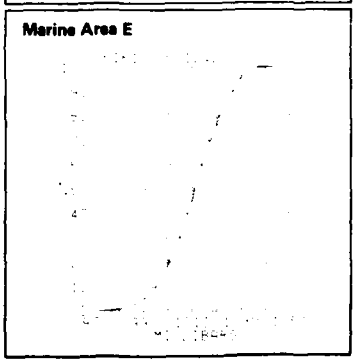












13 Mean sea level pressure

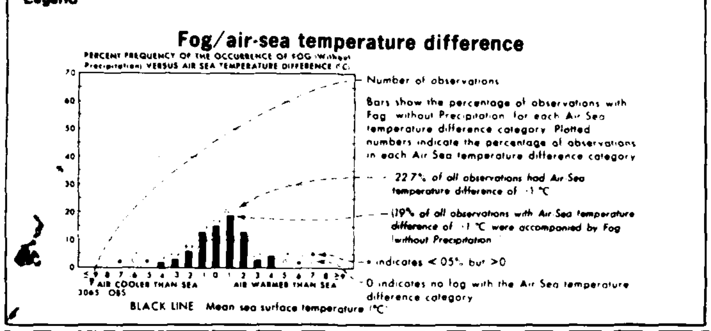
May

AD-A081 311 ALASKA UNIV ANCHORAGE ARCTIC ENVIRONMENTAL INFORMATI--ETC F/G 4/2
CLIMATIC ATLAS OF THE OUTER CONTINENTAL SHELF WATERS AND COASTA--ETC(U)
1977 W A BROWER, H F DIAZ, A S PRECHTEL

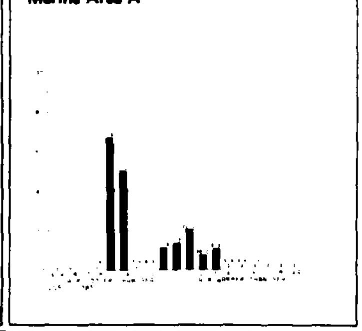
UNCLASSIFIED AEIDC-B-77-VOL-2 NL

3-5

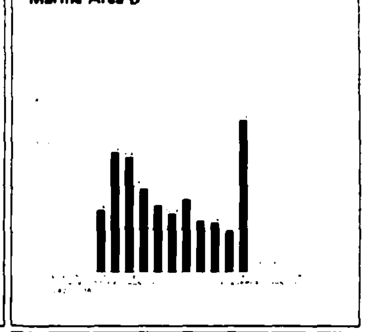
Legend

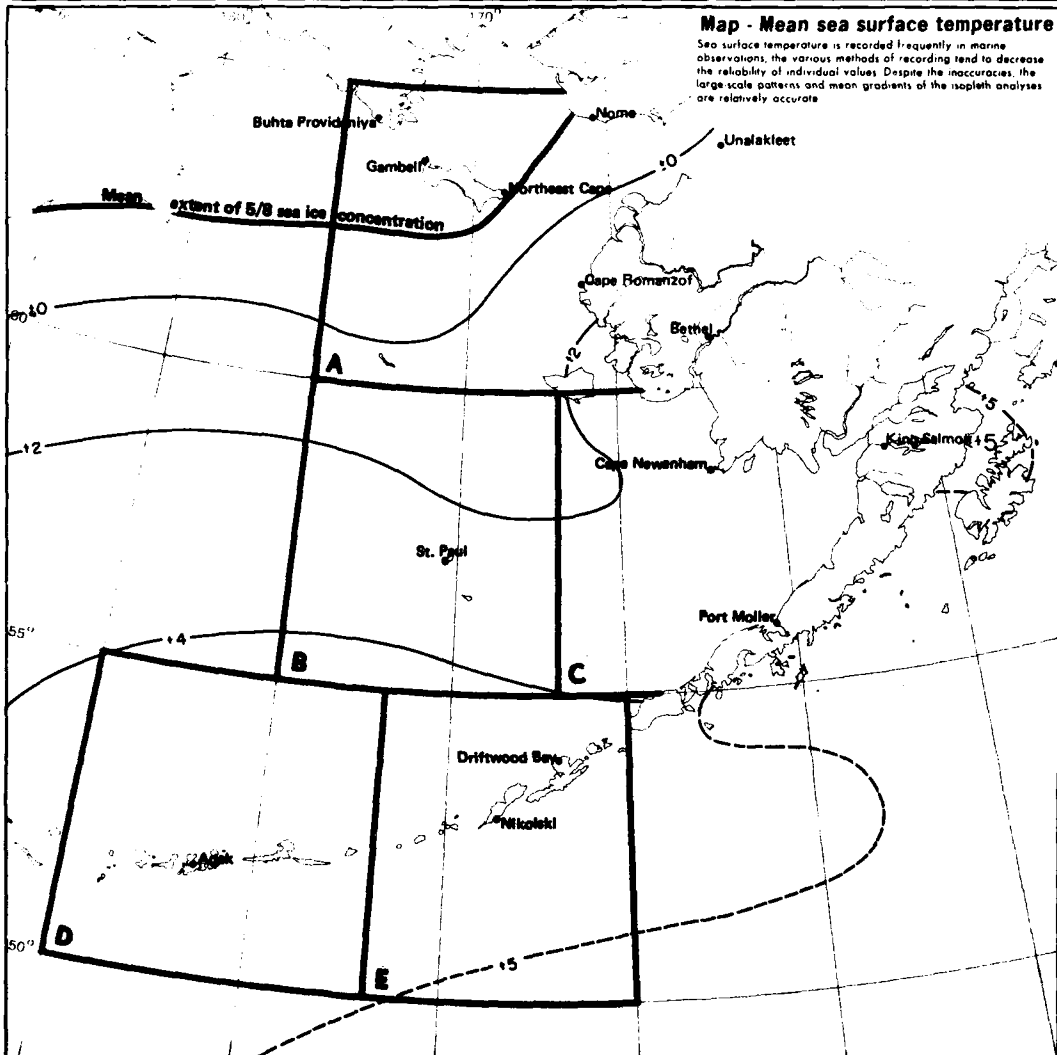


Marine Area A

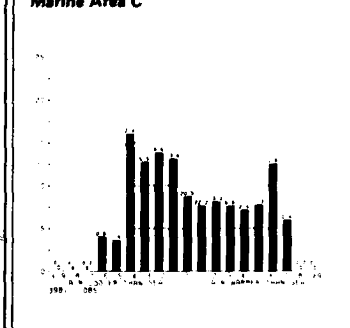


Marine Area B

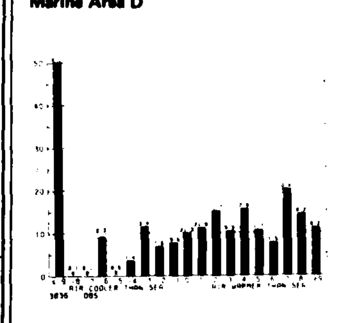




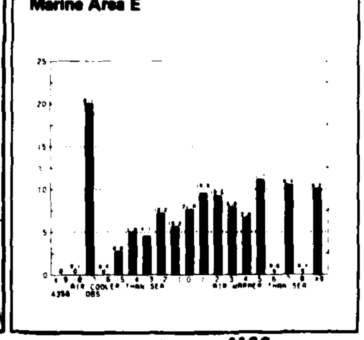
Marine Area C



Marine Area D

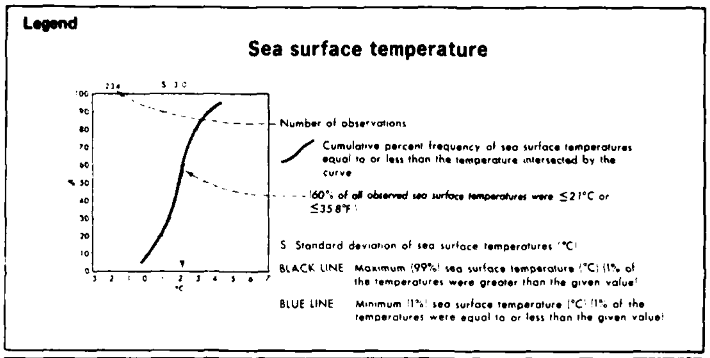


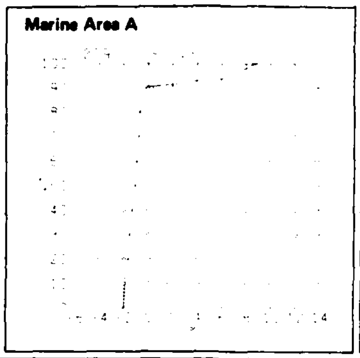
Marine Area E

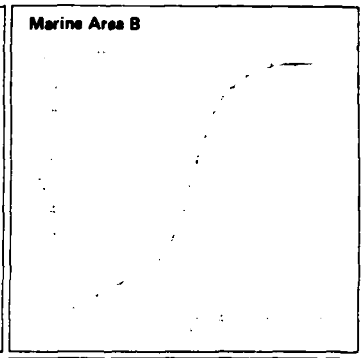


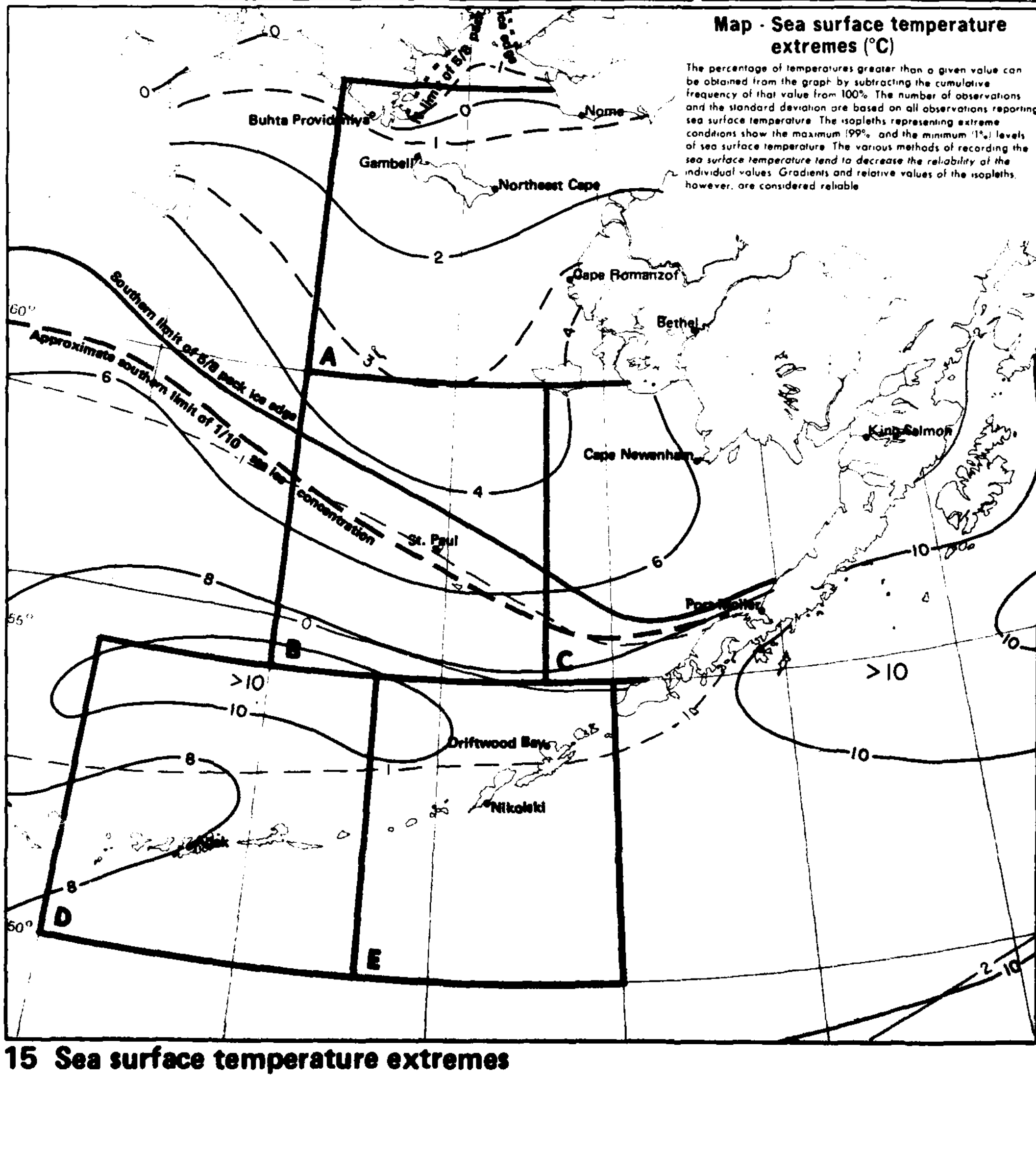
May

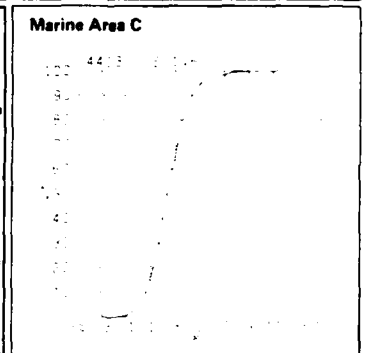
14 Fog/air-sea temperature difference
Mean sea surface temperature

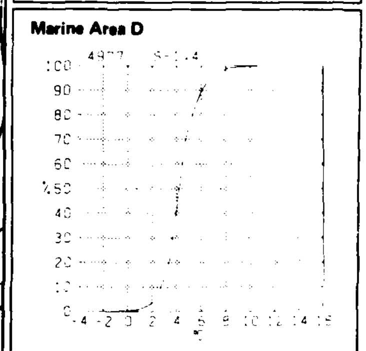


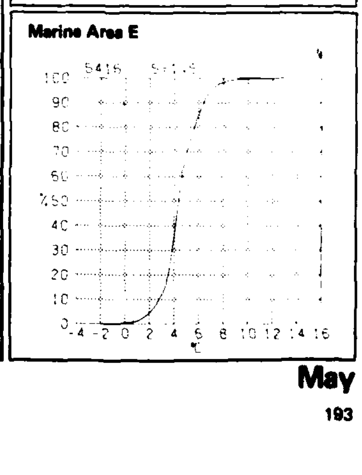










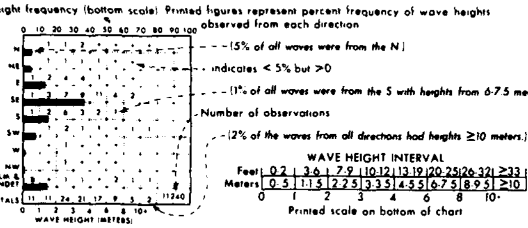


15 Sea surface temperature extremes **May**

Legend **Wave height/direction**

Direction frequency (top scale) Bars represent percent frequency of waves from each direction

Height frequency (bottom scale) Printed figures represent percent frequency of wave heights observed from each direction



WAVE HEIGHT INTERVAL

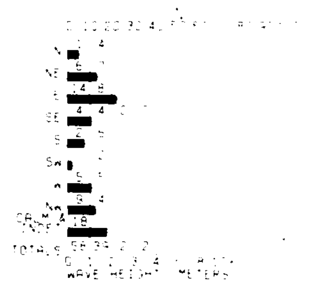
Feet	0-2	3-6	7-9	10-12	13-19	20-25	26-32	≥33		
Meters	0-.5	1-1.5	2-2.5	3-3.5	4-5.5	6-7.5	8-9.5	≥10		
	0	1	2	3	4	6	8	10+		

Printed scale on bottom of chart

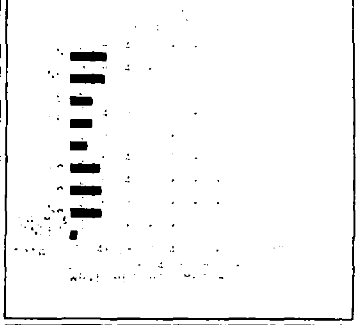
BLACK LINE - Percent frequency of wave height <1.5 meters (<5 feet)

BLUE LINE - Percent frequency of wave height <2.5 meters (<8 feet)

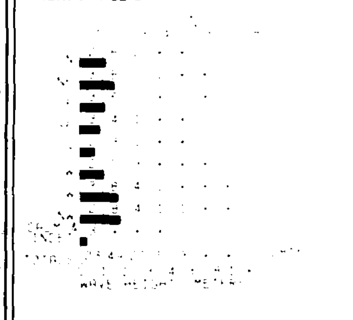
Marine Area A



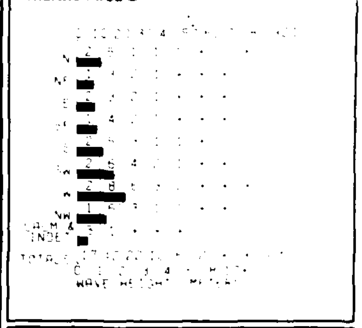
Marine Area B



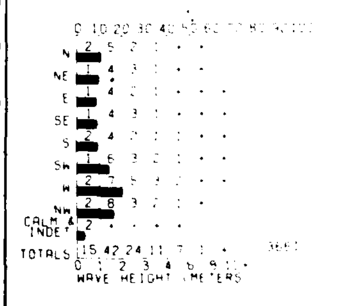
Marine Area C



Marine Area D

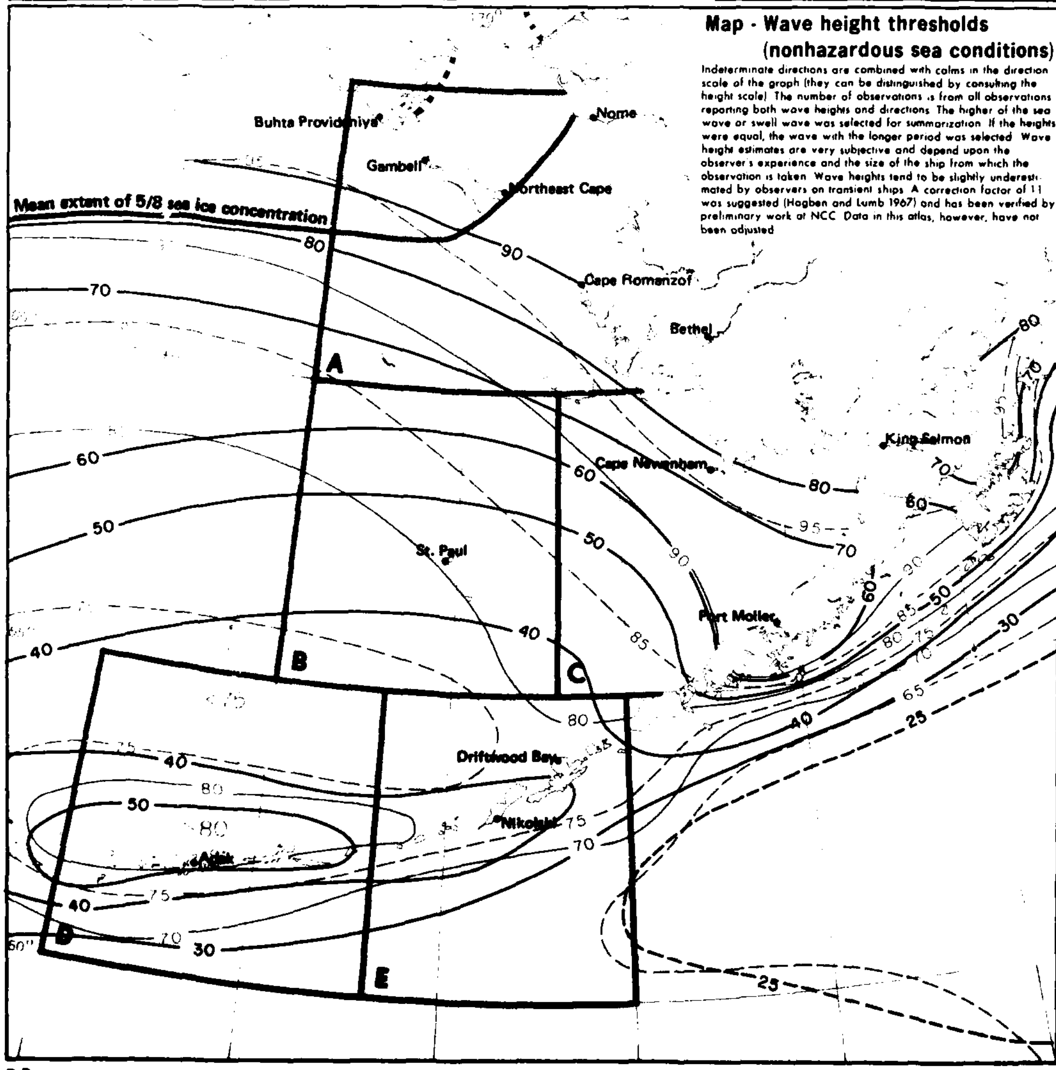


Marine Area E



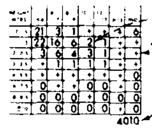
Map - Wave height thresholds (nonhazardous sea conditions)

Indeterminate directions are combined with calms in the direction scale of the graph (they can be distinguished by consulting the height scale). The number of observations is from all observations reporting both wave heights and directions. The higher of the sea wave or swell wave was selected for summarization. If the heights were equal, the wave with the longer period was selected. Wave height estimates are very subjective and depend upon the observer's experience and the size of the ship from which the observation is taken. Wave heights tend to be slightly underestimated by observers on transient ships. A correction factor of 1.1 was suggested (Hogben and Lumb 1967) and has been verified by preliminary work at NCC. Data in this atlas, however, have not been adjusted.



Legend

Wave height/period



Percent frequency of occurrence of wave period and height

- (2% of observed waves had a height of 1-1.5 meters and a period of 10-11 seconds.)
- + indicates < 5% but >0
- Number of observations

Waves are selected on the basis of the higher of sea and swell when both are reported. If both heights are equal, the wave with the longer period is selected.

BLACK LINE	Percent frequency of wave height ≥3.5 meters (≥12 feet)
BLUE LINE	Percent frequency of wave height ≥6 meters (≥20 feet)
BLUE NUMBER	Maximum observed wave height (meters)

Marine Area A

55

Marine Area B

Marine Area C

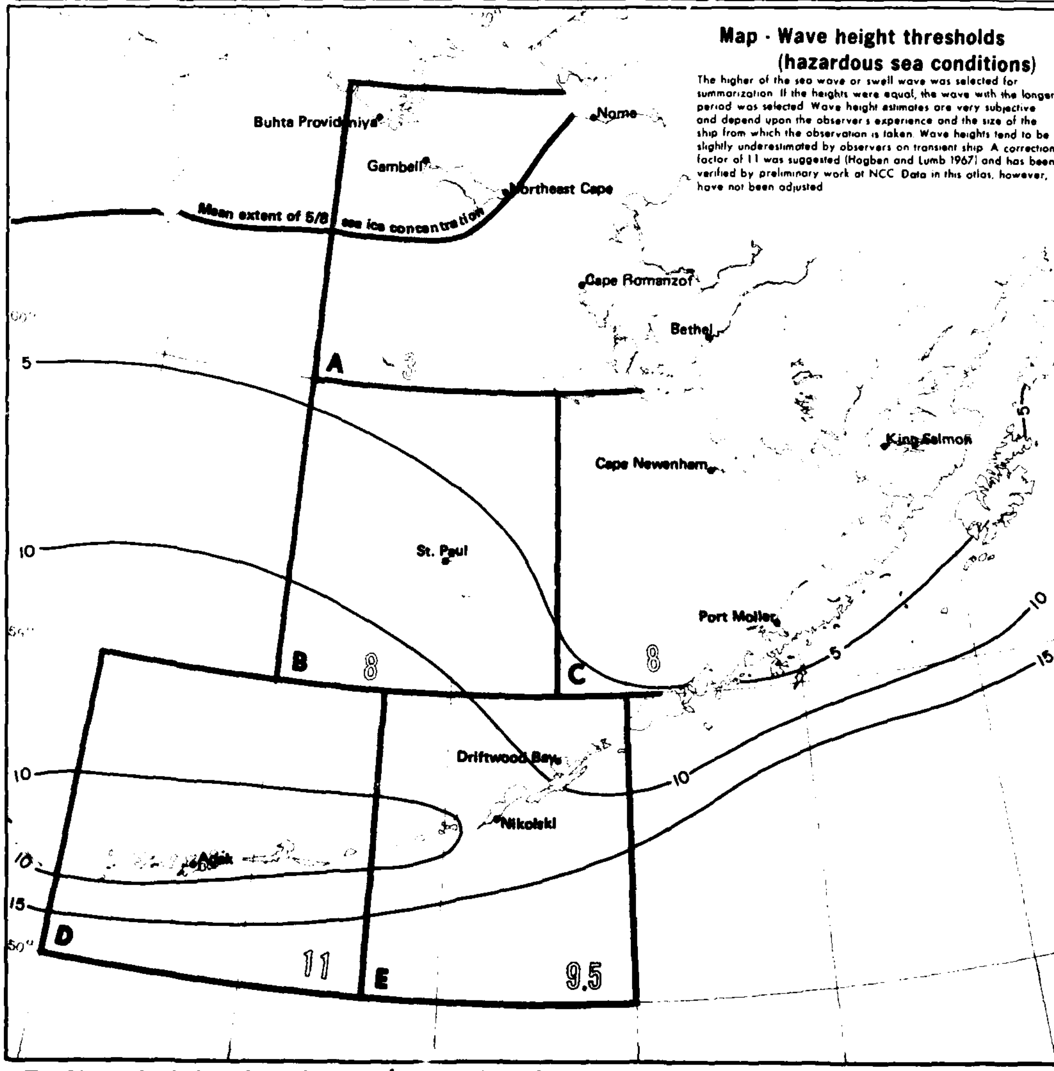
2939

Marine Area D

3038

Map - Wave height thresholds (hazardous sea conditions)

The higher of the sea wave or swell wave was selected for summarization. If the heights were equal, the wave with the longer period was selected. Wave height estimates are very subjective and depend upon the observer's experience and the size of the ship from which the observation is taken. Wave heights tend to be slightly underestimated by observers on transient ship. A correction factor of 1.1 was suggested (Hogben and Lumb 1967) and has been verified by preliminary work at NCC. Data in this atlas, however, have not been adjusted.



Marine Area E

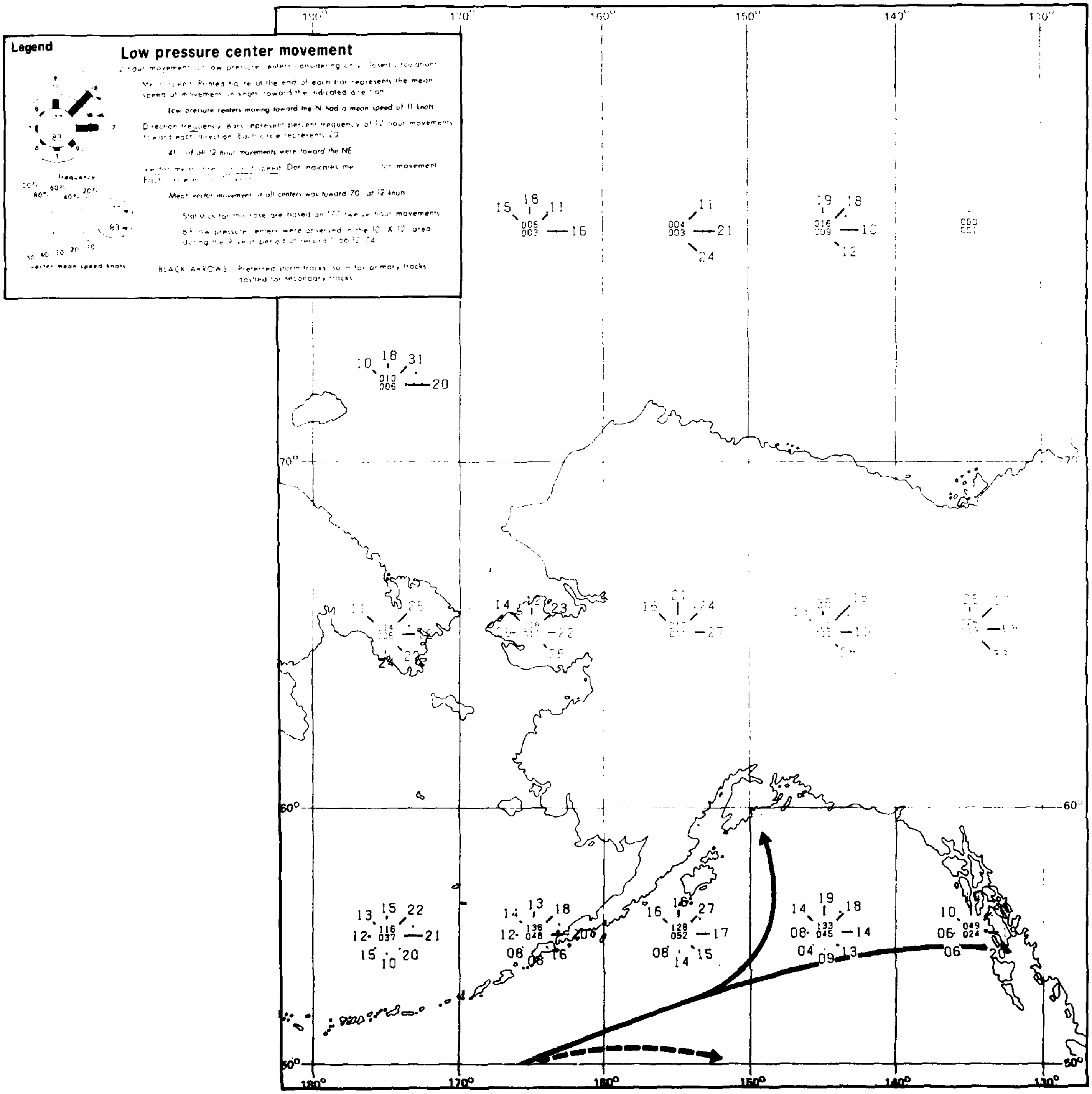
PERIOD (SECONDS)

HEIGHT (MTRS)	<6	6-7	8-9	10-11	12-13	>13	IND
0-.5	10	2	1	+	0	0	+
1-1.5	19	14	5	1	1	+	1
2-2.5	4	9	7	2	1	+	1
3-3.5	1	3	4	1	+	+	+
4-5.5	+	2	2	1	1	+	+
6-7.5	0	+	+	+	+	+	0
8-9.5	0	+	+	+	0	+	0
≥10	0	0	0	0	0	0	0

3742

17 Wave height thresholds (hazardous)

May

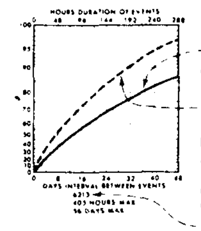


May

18 Low pressure center movement

Legend

Persistence of visibility <2 n. mi.



Hours duration of events   Days interval between events

Cumulative percent frequency of hours duration equal to or less than the number of hours intersected by the solid curve

— — (80% of the events had a duration ≤216 hours)

Cumulative percent frequency of days interval between event, equal to or less than the number of days intersected by the broken curve

— — (88% of the events were followed by another event in 28 days or less)

The maximum value(s) of hours duration and or the days interval will be displayed when the graph limits are exceeded

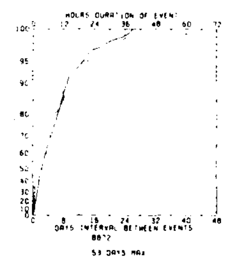
Durations and intervals for a particular month extend from the time they begin (or the first of the month if already in progress) and are terminated at the actual ending time, regardless of what month that may be

Number of observations

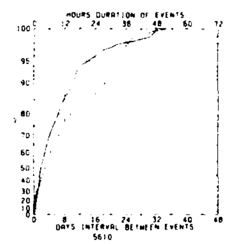
Top and bottom scales are variable to allow for variations in the data

Adak

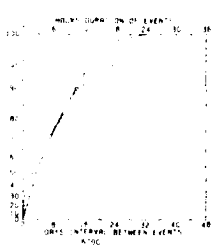
Nome



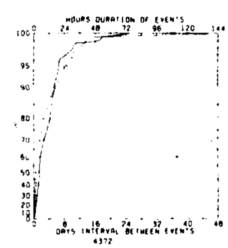
Moses Point



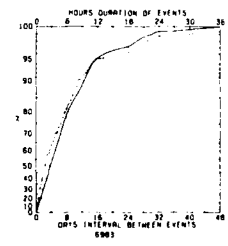
Unalakleet



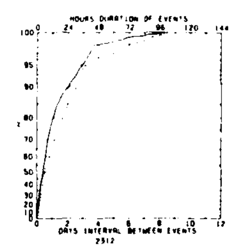
Cape Romanzof



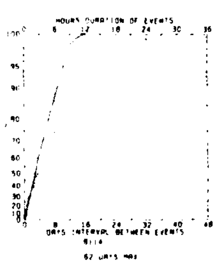
Bethel



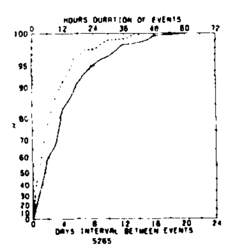
Nikolski



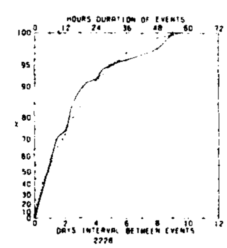
King Salmon



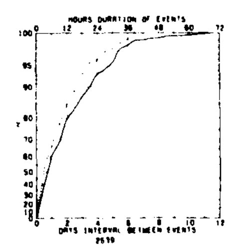
St. Paul



Port Moller



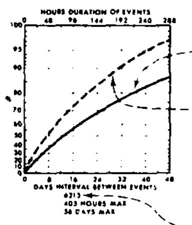
Driftwood Bay



19 Persistence of visibility <2 n. mi.   **May**

Legend

Persistence of wind ≥10 kts.



Hours duration of events Days interval between events

Cumulative percent frequency of hours duration equal to or less than the number of hours intersected by the solid curve

(80% of the events had a duration ≤216 hours.)

Cumulative percent frequency of days interval between events equal to or less than the number of days intersected by the broken curve

(88% of the events were followed by another event in 28 days or less.)

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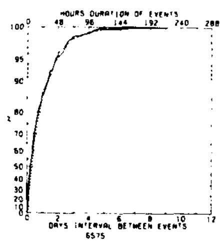
Durations and intervals for a particular month extend from the time they begin (or the first of the month if already in progress) and are terminated at the actual ending time, regardless of what month that may be

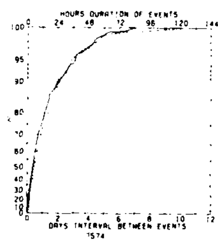
Number of observations

Top and bottom scales are variable to allow for variations in the data

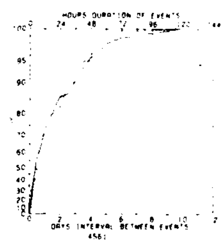
Adak



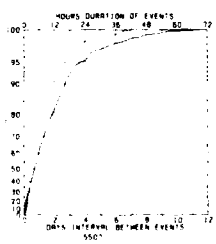
Nome



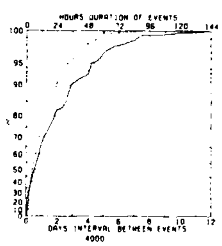
Moses Point



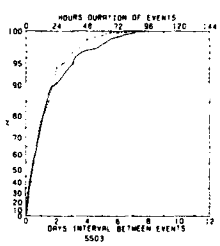
Unalakleet



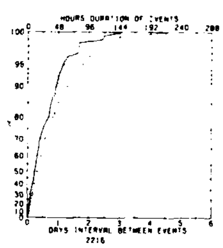
Cape Romanzof



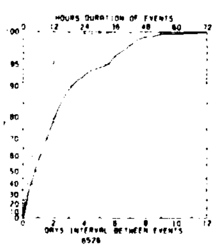
Bethel



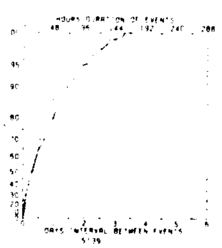
Nikolski



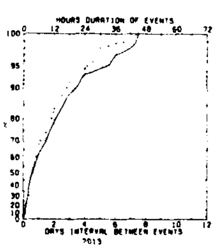
King Salmon



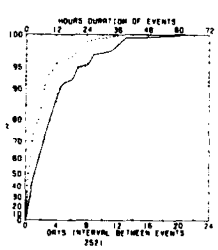
St. Paul



Port Moller

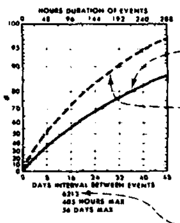


Driftwood Bay



Legend

Persistence of wind ≥20 kts.



Hours duration of events · Days interval between events.

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(80% of the events had a duration ≤216 hours.)

Cumulative percent frequency of days interval between events equal to or less than the number of days intersected by the broken curve

(88% of the events were followed by another event in 20 days or less.)

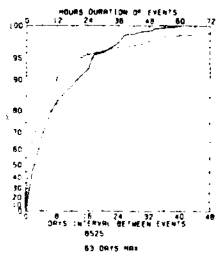
The maximum value(s) of hours duration and/or the days interval will be displayed when the graph limits are exceeded

Durations and intervals for a particular month extend from the time they begin (or the first of the month if already in progress) and are terminated at the actual ending time, regardless of what month that may be.

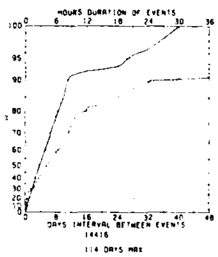
Number of observations.

Top and bottom scales are variable to allow for variations in the data

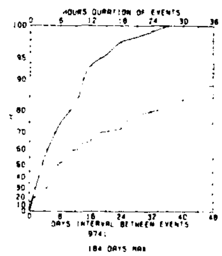
Adak



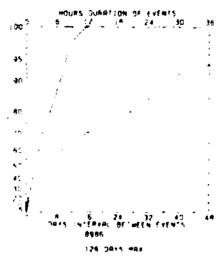
Nome



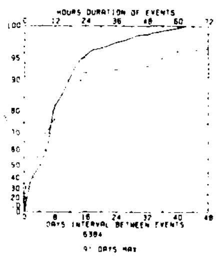
Moses Point



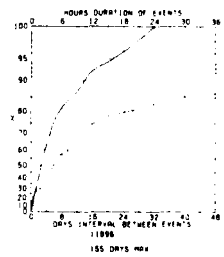
Unalakleet



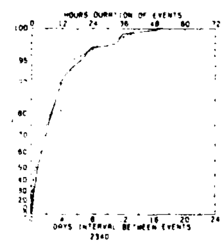
Cape Romanzof



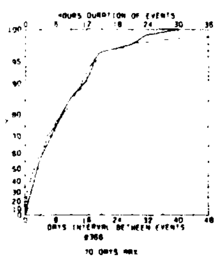
Bethel



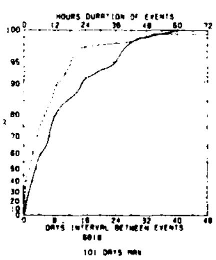
Nikolski



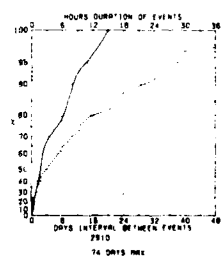
King Salmon



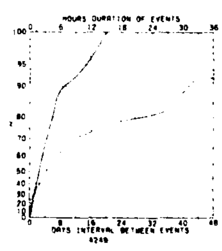
St. Paul



Port Moller



Driftwood Bay



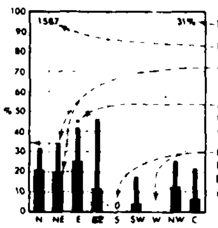
21 Persistence of wind ≥20 kts. **May**

Legend

Precipitation/wind direction

% Pcpn: % Liquid, % Snow

Percent frequency of surface wind observations from each direction and calm that were accompanied by precipitation, subdivided into liquid type (including freezing rain and freezing drizzle) and snow



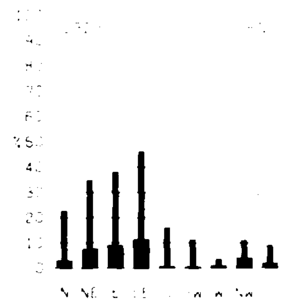
- Percentage of present weather observations reporting precipitation
- Number of observations
- (34% of all NE winds were accompanied by precipitation, of which 14% was liquid and 20% was snow
- An asterisk in the column for a given direction or calm indicates that the percentage was based on 10 30 observations of present weather and wind direction
- 0 replaces bar when no precipitation was observed with winds from a given direction (or calm). No bar graph is presented if less than 10 observations containing present weather were reported for a given direction (or calm)

Map - Precipitation

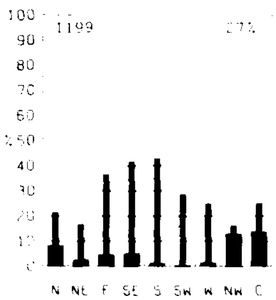
BLACK LINE Percent frequency of observations reporting precipitation

Of all the elements recorded in historical marine observations, precipitation is one of those most subject to interpretation error from coding practices, observers preference for certain present weather codes, and other biases

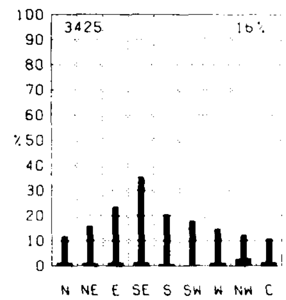
Buhta Provideniya



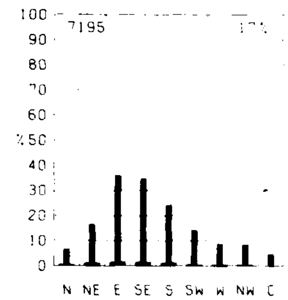
Gambell



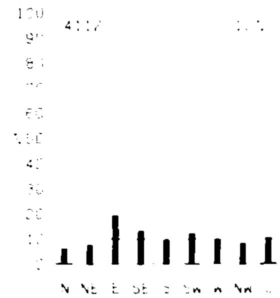
Northeast Cape



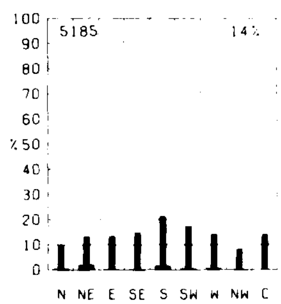
Nome



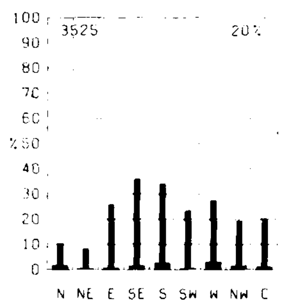
Moses Point



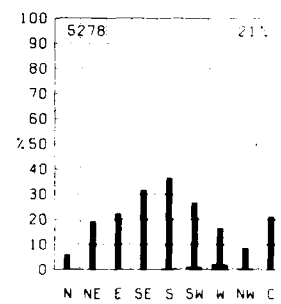
Unalakleet



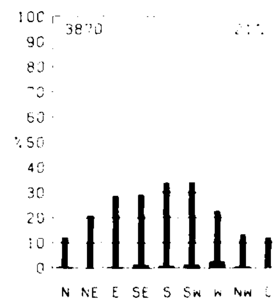
Cape Romanzof



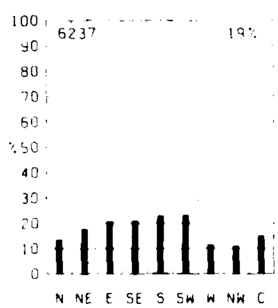
Bethel



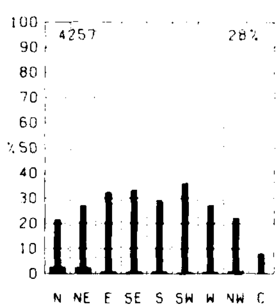
Cape Newenham



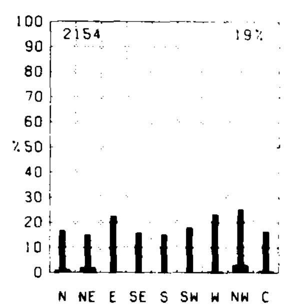
King Salmon



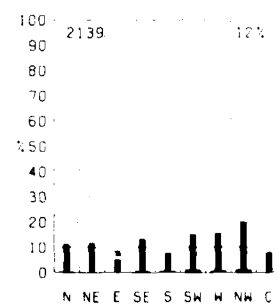
St. Paul

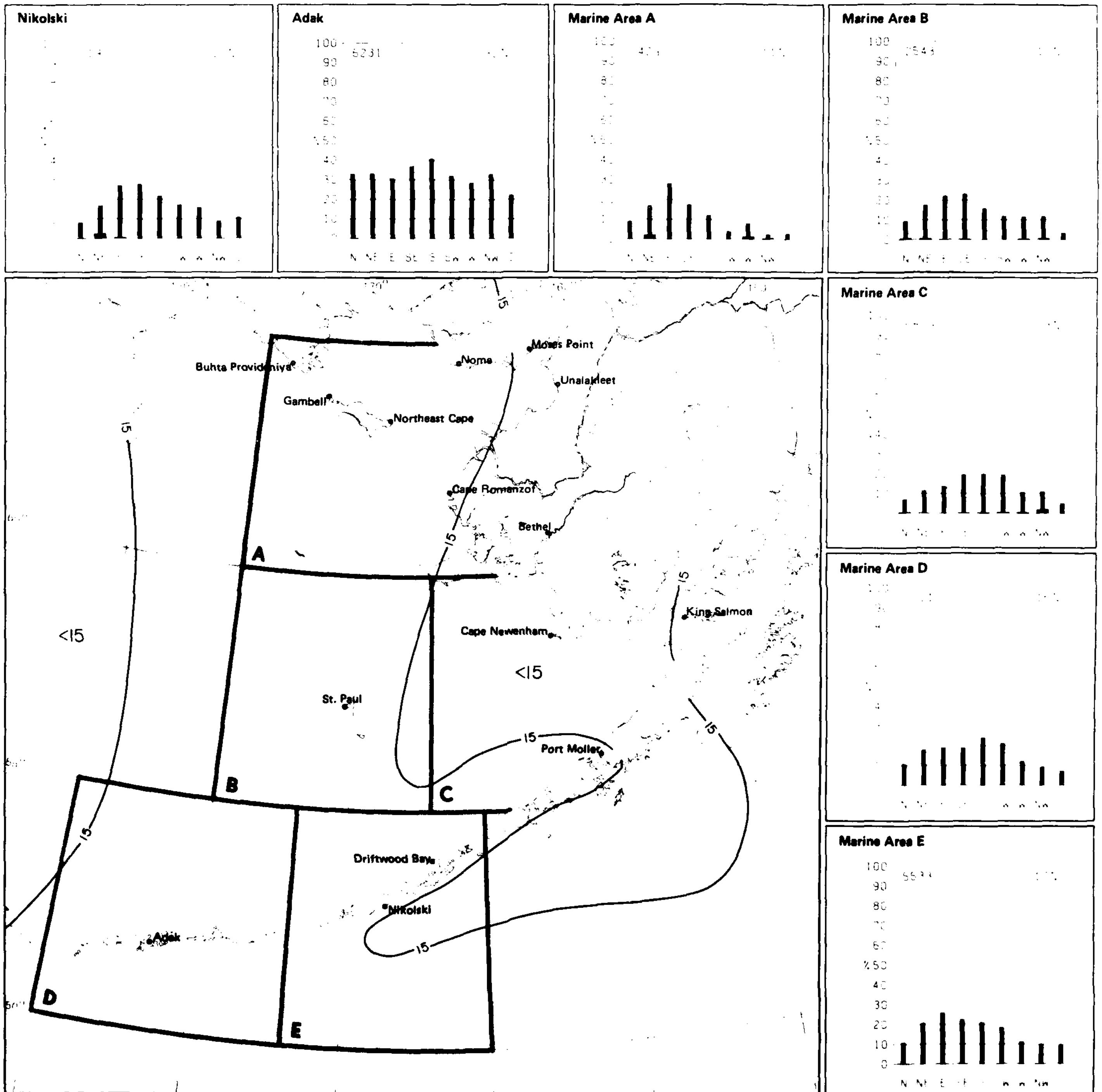


Port Moller



Driftwood Bay

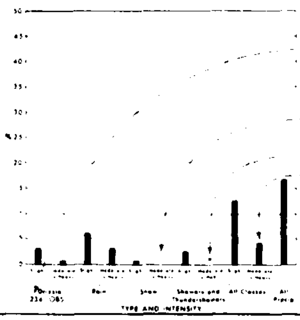




1 Precipitation **June**

Precipitation types

Legend



Percent frequency of precipitation by type and intensity

Number of observations

Bars show percent frequency of observations reporting Precipitation of various types and intensities

0 indicates no observations in the category

• indicates < 05% but >0

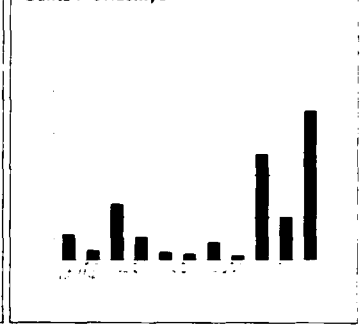
(4 0% of all observations recorded moderate to heavy precipitation)

Map · Snow

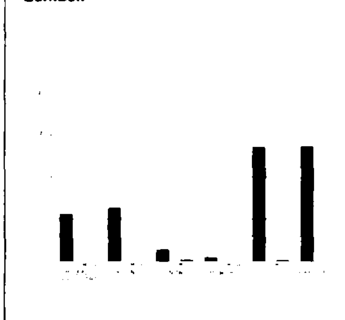
BLACK LINE Percent frequency of precipitation observations reporting snow

The percent frequency of observations reporting snow for a given point can be determined by multiplying the percent frequency of observations reporting precipitation (map 1) with that of precipitation observations reporting snow (map 2)

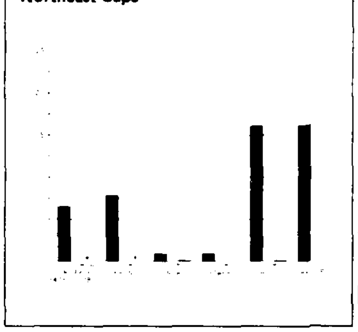
Buhta Provideniya



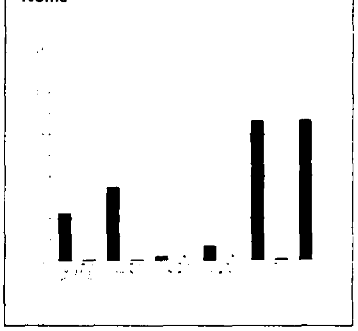
Gambell



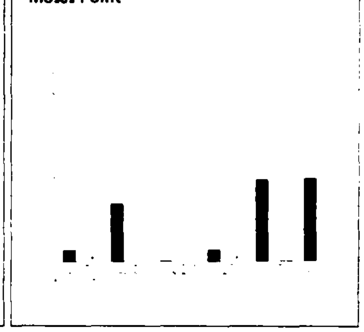
Northeast Cape



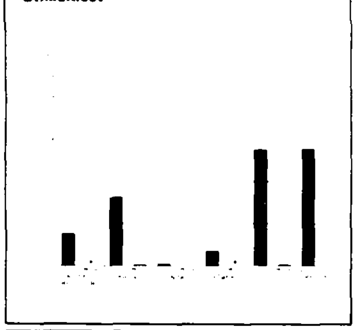
Nome



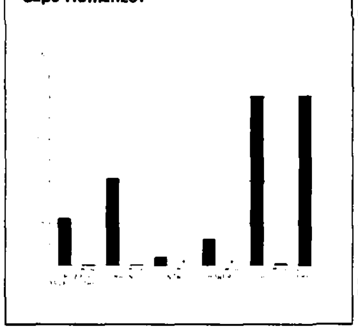
Moses Point



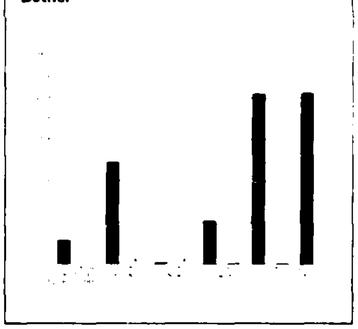
Unalakleet



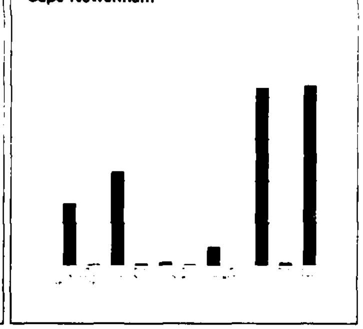
Cape Romanzof



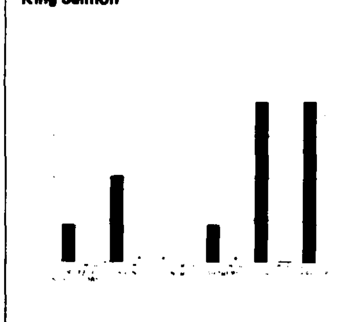
Bethel



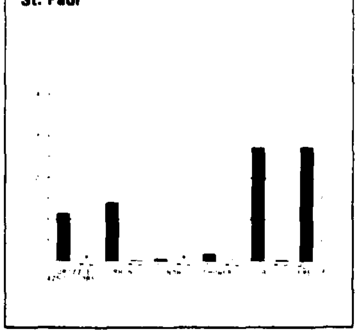
Cape Newenham



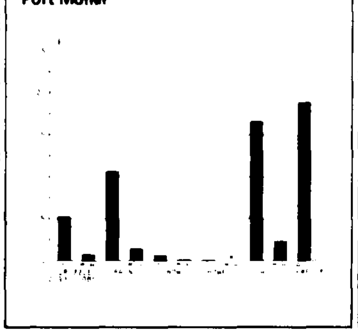
King Salmon



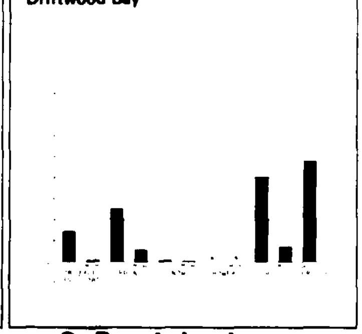
St. Paul

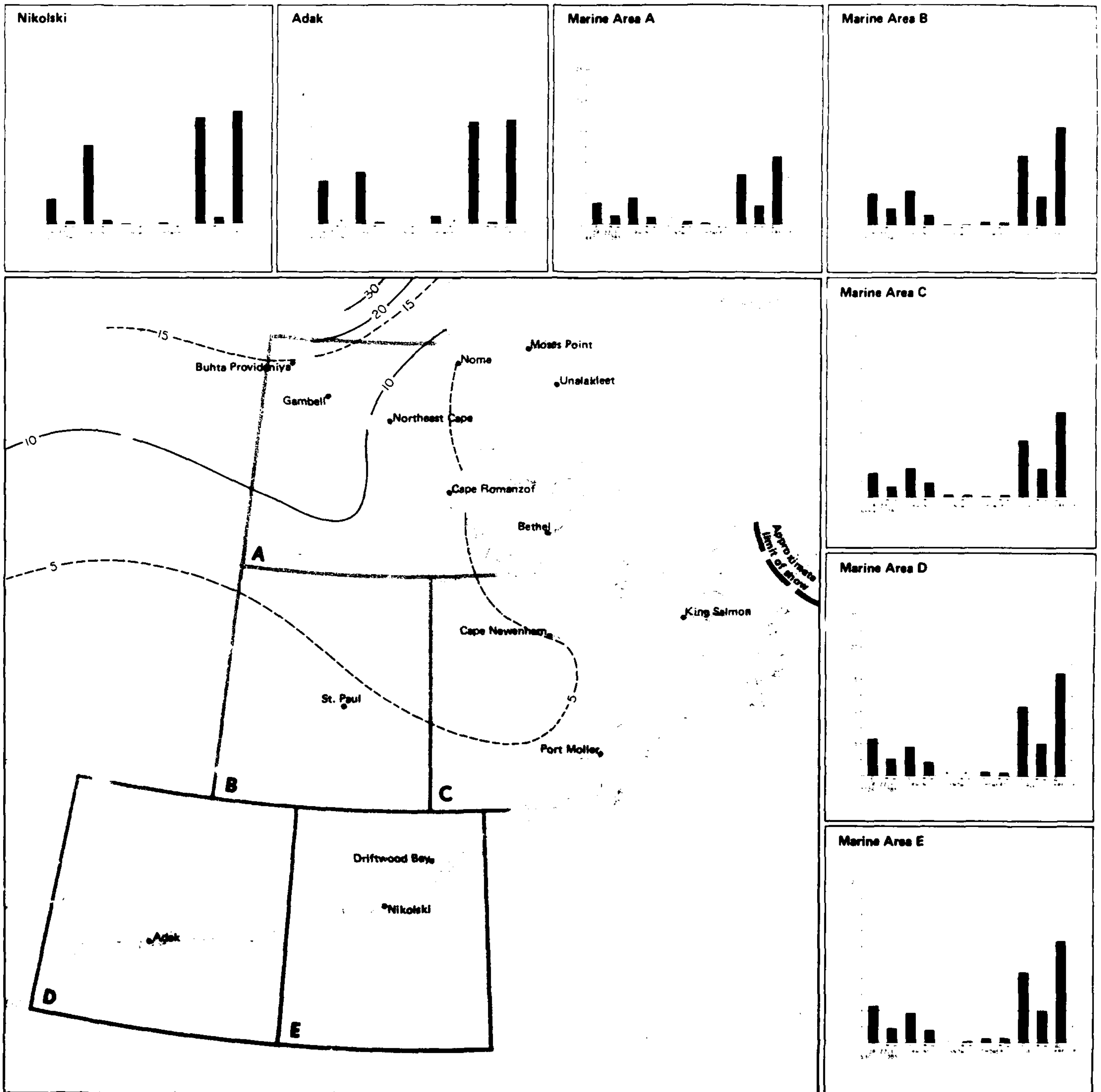


Port Moller



Driftwood Bay

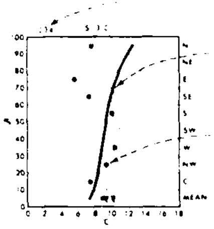



Nikolski
Adak
Marine Area A
Marine Area B
Marine Area C
Marine Area D
Marine Area E
30
20
15
15
10
10
5
5
Buhta Providniya
Gambell
Nome
Moses Point
Unalakleet
Northeast Cape
Cape Romanzof
Bethel
Approximate limit of snow
King Salmon
Cape Newenham
St. Paul
Port Moller
A
B
C
D
E
Driftwood Bay
Nikolski
Adak

2 Snow **June**

Legend

Air temperature/wind direction



- - Number of observations

Cumulative percent frequency of temperatures equal to or less than the temperature intersected by the curve

70% of all temperatures were ≤10.3 °C or ≤50.5 °F

S Standard deviation of temperatures °C

Mean temperature for each wind direction, calm and for all data combined are represented by dots

With NW winds, the mean temperature was 9.4 °C or 48.9 °F

Indicates that the mean temperature for a direction or calm was computed from 10-30 observations

The mean temperature is omitted when less than 10 observations for a direction or calm were available

Map · Air temperature mean and thresholds

BLACK LINE Percent frequency of temperature ≤0°C ≤32°F

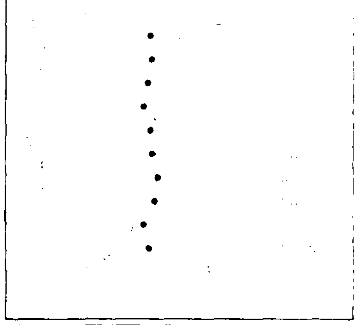
RED LINE Mean air temperature °C

BLUE LINE Percent frequency of wind chill temperature ≤ 30°C ≤ 22°F

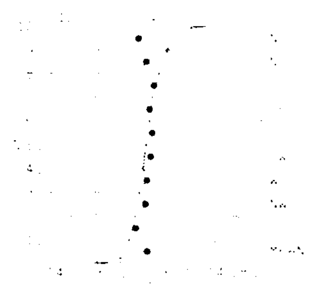
Air temperature readings recorded on transient ships in warm sunny weather appear biased toward high temperatures apparently because of improper instrument exposure and ventilation. Despite the inaccuracies, the large scale patterns and mean gradients of the isopleth analyses are relatively accurate.

The temperature scale of the graph may vary in both range and class interval. The percentage of temperature observations greater than a given value can be obtained by subtracting the cumulative percent frequency of that value from 100%. The number of observations and the standard deviation plus the plotted points on the graphs are based on those observations reporting both temperature and wind direction. The cumulative curve is based on all observations reporting temperature with or without wind direction.

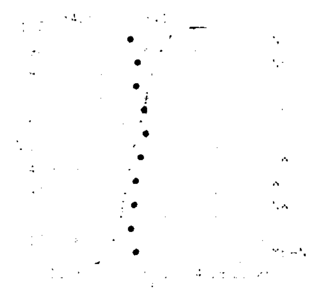
Buhta Provideniya



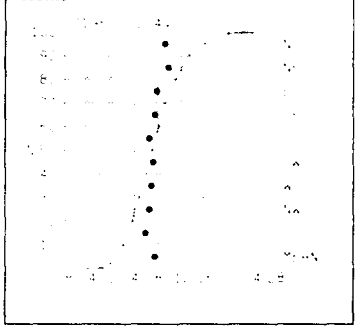
Gambell



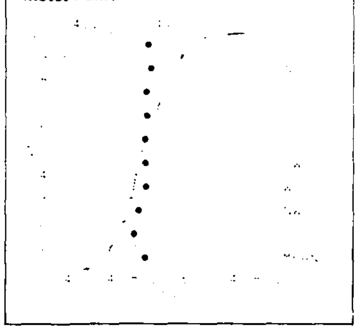
Northeast Cape



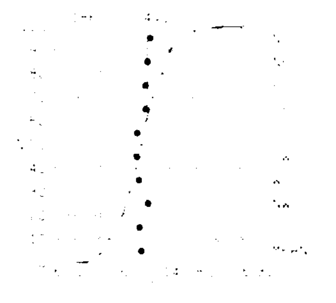
Nome



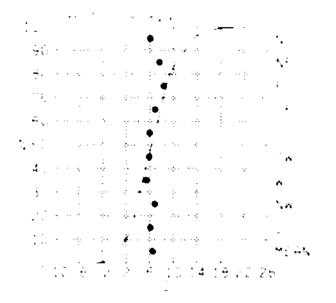
Moses Point



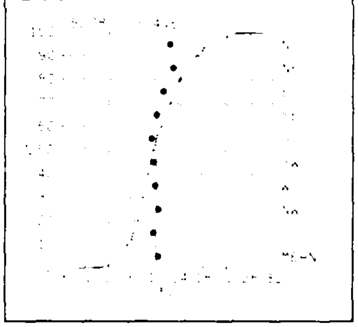
Unalakleet



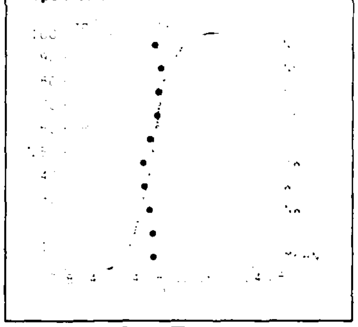
Cape Romanzof



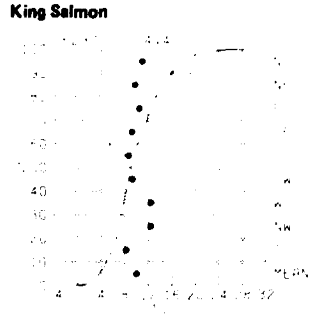
Bethel



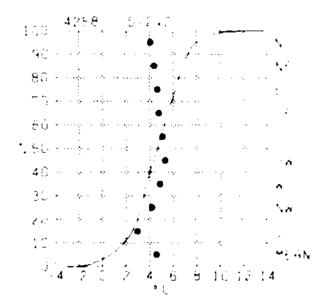
Cape Newenham



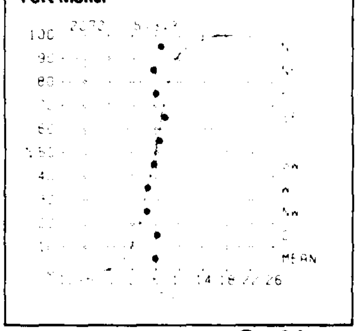
King Salmon



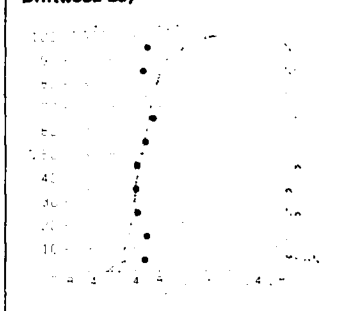
St. Paul



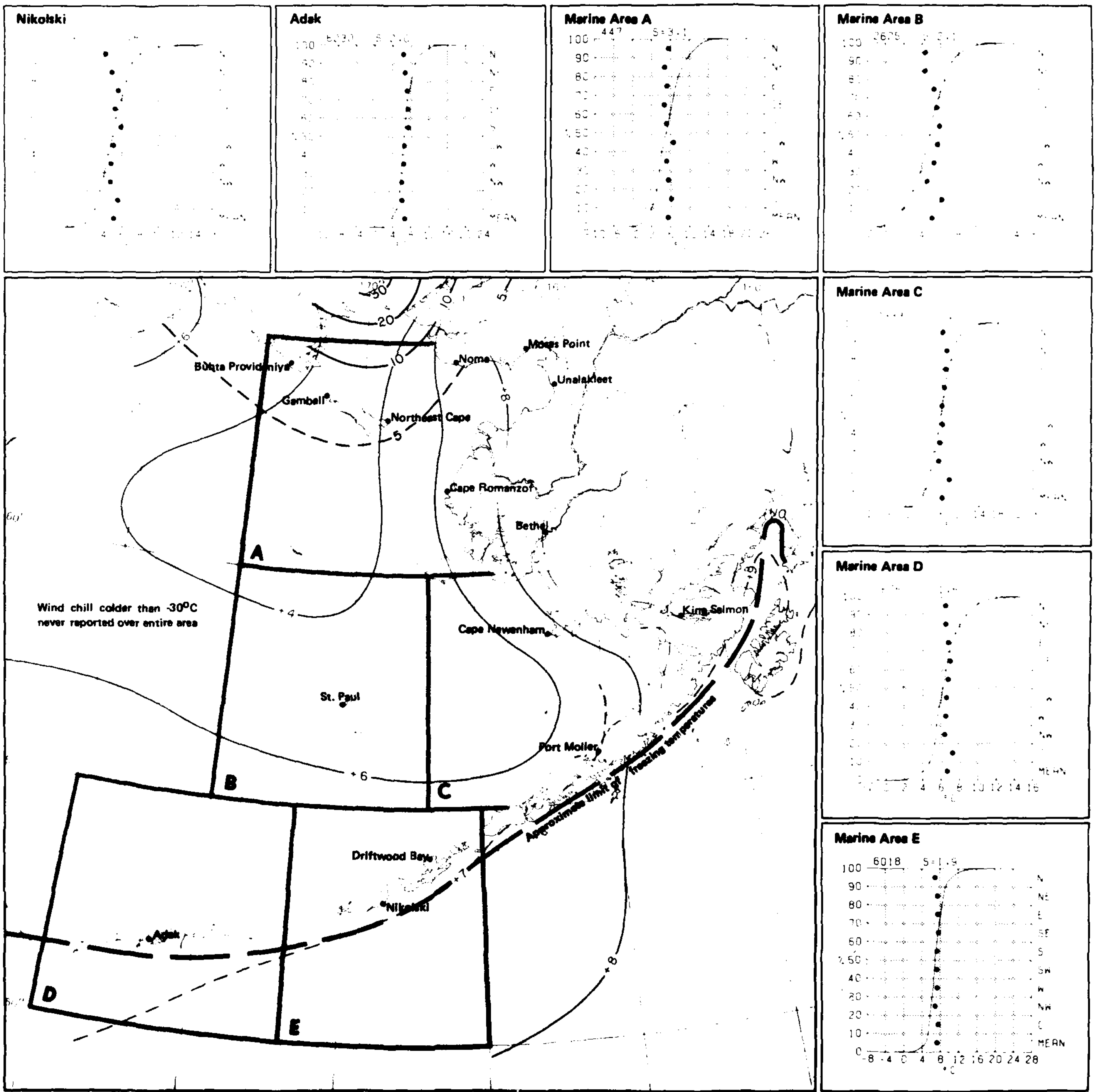
Port Moller



Driftwood Bay



June **3 Air temperature/wind direction**

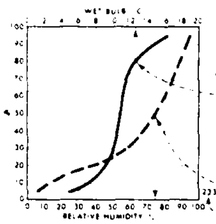


3 Air temperature mean and thresholds

June

Legend

Wet bulb/relative humidity



Cumulative percent frequency of wet bulb temperatures equal to or less than the temperature intersected by the curve top scale

Wet bulb °C

80% of all observed wet bulb temperatures were ≤12.5°C or 54.5°F

Cumulative percent frequency of relative humidities equal to or less than the humidity intersected by the curve bottom scale

Relative humidity

50% of all observed relative humidities were ≤74%

Number of observations

Map - Mean dew point temperature

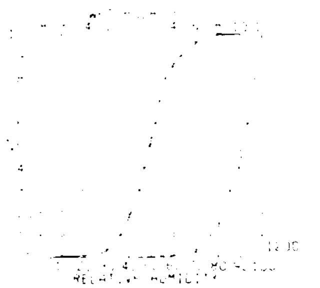
BLACK LINE Mean dew point temperature °C

The observation count of the graph [illegible] those observations reporting both air and wet bulb temperatures both are required in computing the relative humidity. The percentage of observations of either element greater than a given value can be obtained by subtracting the cumulative percent frequency of that value from 100%.

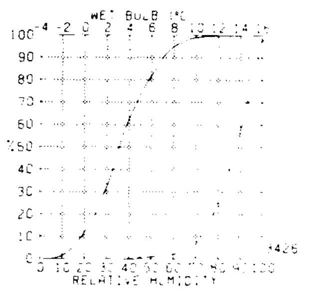
Buhta Provideniya

Insufficient Data

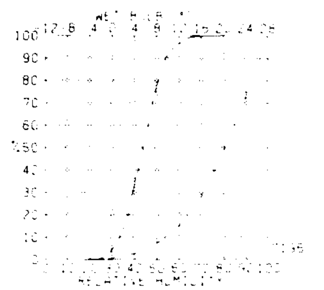
Gambell



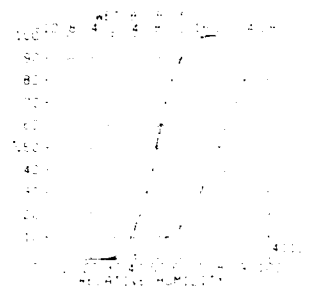
Northeast Cape



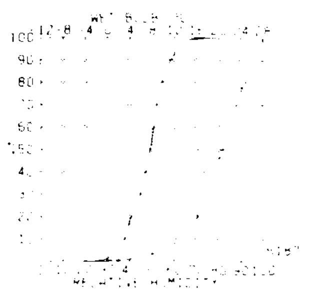
Nome



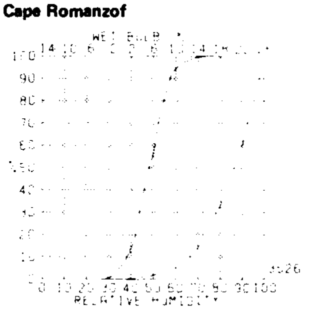
Moses Point



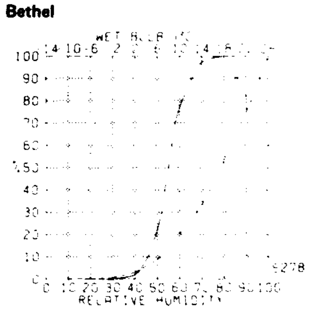
Unalakleet



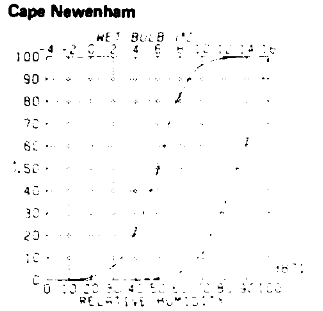
Cape Romanzof



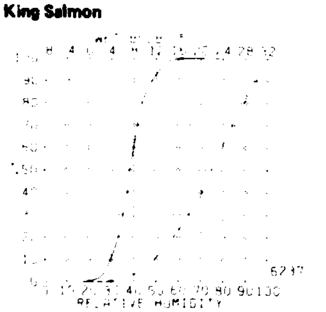
Bethel



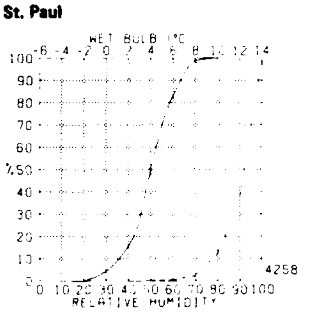
Cape Newenham



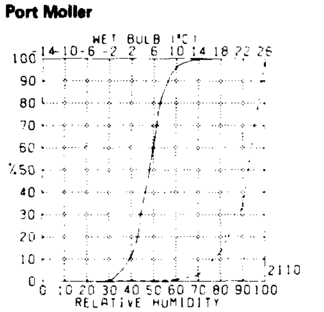
King Salmon



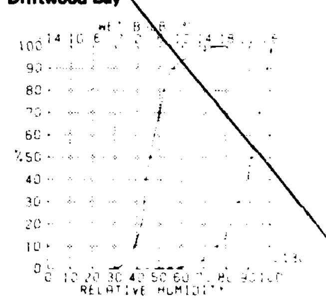
St. Paul

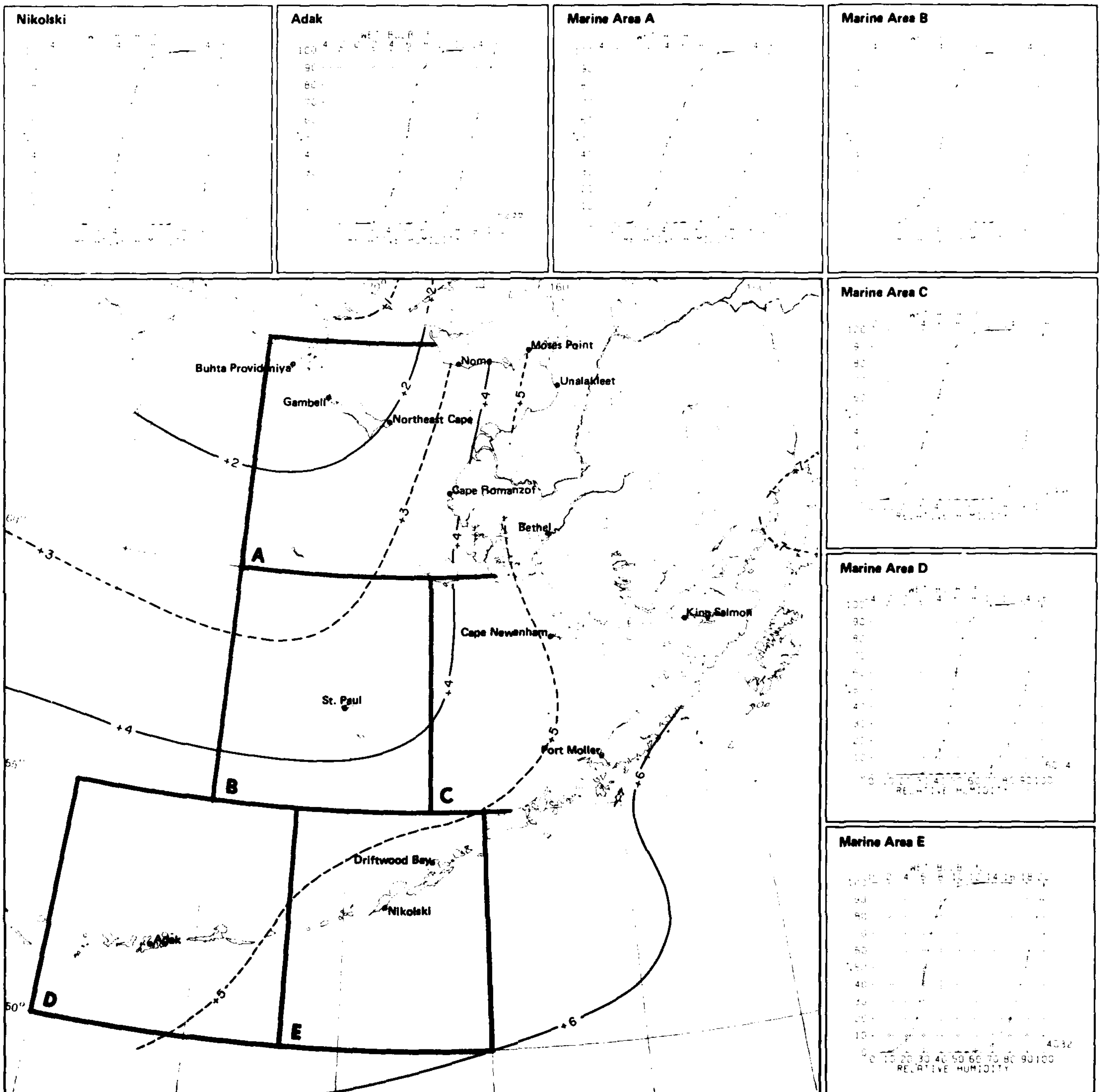


Port Moller



Driftwood Bay





4 Mean dew point temperature **June**

Legend

Air temperature/wind speed

WIND SPEED (kts)

Percent frequency of simultaneous occurrence of specified temperature (°C) and wind speed (knots)

(1% of all observations reported temperature 2-3°C simultaneously with wind speed of 22-33 kts)

Indicates < 5% but >0

Number of observations

3550

Map - Air temperature extremes (°C)

BLACK LINE Maximum (99%) air temperature (1% of temperatures were greater than the given value)

BLUE LINE Minimum (1%) air temperature (1% of temperatures were equal to or less than the given value)

The graph can be used to determine the extent of human discomfort from the combined effects of extreme heat or cold and winds or to estimate the likelihood of superstructure icing. Icing potential increases as the air temperature drops below freezing and the winds increase above 10 knots (12 mph) and may become quite severe with temperatures equal to or less than -9°C (16°F) and winds equal to or greater than 34 knots (39 mph)

Buhta Providenya

WIND SPEED (KTS)

[illegible]

2321

Gambell

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
12.13	+	+	0	0	0
10.11	0	1	+	0	0
8.9	+	2	1	0	0
6.7	1	4	3	+	0
4.5	1	9	6	+	0
2.3	4	15	18	3	0
0.1	2	9	10	1	0
-2.-1	2	4	2	+	0
-4.-3	+	+	+	+	0
-6.-5	0	+	+	+	0
-8.-7	0	0	0	0	0

1200

Northeast Cape

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
16.17	0	+	+	0	0
14.15	+	+	+	+	0
12.13	+	1	1	+	0
10.11	+	2	1	+	0
8.9	2	5	3	+	0
6.7	4	10	6	1	+
4.5	4	10	6	1	+
2.3	7	13	5	1	0
0.1	4	7	1	+	0
-2.-1	2	2	1	0	0
-4.-3	+	+	+	0	0

3425

Nome

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
26.27	0	+	+	0	0
24.25	+	+	+	0	0
22.23	+	+	+	+	0
20.21	+	+	+	0	0
18.19	+	1	1	+	0
16.17	+	2	1	+	0
14.15	+	2	1	+	0
12.13	1	5	3	+	0
10.11	+	6	3	+	0
8.9	2	9	5	+	0
≤7	8	31	15	1	0

7196

Moses Point

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
28.29	0	+	+	0	0
26.27	0	+	+	0	0
24.25	0	+	+	0	0
22.23	+	+	+	0	0
20.21	+	+	+	+	0
18.19	+	2	2	0	0
16.17	+	3	3	+	0
14.15	1	5	3	+	0
12.13	2	9	5	+	0
10.11	2	8	4	+	0
≤9	8	26	16	1	0

4112

Unalakleet

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
28.29	0	+	+	0	0
26.27	0	+	+	0	0
24.25	0	+	+	0	0
22.23	0	+	+	0	0
20.21	0	+	+	+	0
18.19	+	1	1	0	+
16.17	+	2	1	+	0
14.15	+	4	2	0	0
12.13	2	9	4	+	+
10.11	2	10	4	+	0
≤9	8	34	13	1	0

5186

Cape Romanzof

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
22.23	+	0	0	0	0
20.21	+	+	0	0	0
18.19	+	+	+	0	0
16.17	+	1	1	+	0
14.15	1	1	1	+	0
12.13	1	3	3	+	0
10.11	2	4	3	+	0
8.9	3	8	6	+	0
6.7	5	10	6	+	0
4.5	3	10	6	+	0
≤3	5	10	7	+	0

3525

Bethel

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
28.29	0	0	+	0	0
26.27	0	+	+	0	0
24.25	+	+	+	0	0
22.23	+	1	+	0	0
20.21	+	1	1	0	0
18.19	+	3	2	0	0
16.17	+	4	2	0	0
14.15	+	4	3	+	0
12.13	1	9	4	+	0
10.11	1	9	4	+	0
≤9	3	28	17	+	0

5278

Cape Newenham

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
22.23	0	0	+	0	0
20.21	0	0	0	0	0
18.19	+	+	+	0	0
16.17	+	+	+	0	0
14.15	1	1	1	+	0
12.13	2	3	1	+	0
10.11	3	4	2	+	0
8.9	7	10	5	1	0
6.7	8	15	8	1	0
4.5	4	6	4	+	0
≤3	3	5	4	+	+

3870

King Salmon

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
30.31	0	+	0	0	0
28.29	0	+	+	0	0
26.27	+	+	+	0	0
24.25	+	+	+	0	0
22.23	0	1	+	+	0
20.21	+	1	+	+	0
18.19	+	2	1	+	0
16.17	+	3	2	+	0
14.15	+	4	2	+	0
12.13	1	7	5	1	0
≤11	9	38	18	2	+

6237

St. Paul

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
12.13	0	+	+	+	0
10.11	0	+	+	+	0
8.9	+	3	3	+	0
6.7	+	14	16	1	+
4.5	1	12	15	2	0
2.3	1	9	14	2	+
0.1	+	2	3	1	0
-2.-1	+	1	+	+	0
-4.-3	0	+	+	0	0
-6.-5	0	0	0	0	0
-8.-7	0	0	0	0	0

4258

Port Moller

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
18.19	+	+	0	0	0
16.17	+	+	+	0	0
14.15	+	1	+	0	0
12.13	1	2	+	+	0
10.11	1	3	1	0	0
8.9	4	10	3	+	0
6.7	7	17	5	+	0
4.5	6	12	3	+	0
2.3	2	10	2	0	0
0.1	1	4	1	0	0
≤-1	+	1	1	0	0

2072

Driftwood Bay

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
18.19	+	+	+	0	0
16.17	1	1	+	+	0
14.15	1	+	+	0	0
12.13	1	1	1	0	0
10.11	1	2	1	+	0
8.9	3	7	2	+	0
6.7	7	13	4	0	0
4.5	7	14	5	+	0
2.3	7	12	2	0	0
0.1	1	3	1	+	0
-2.-1	+	+	+	0	0

2130

Nikolski

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥34
16.17	0	•	0	0	0
14.15	•	•	0	0	0
12.13	•	•	0	0	0
10.11	•	1	•	•	0
8.9	•	3	2	•	0
6.7	3	15	13	2	0
4.5	3	17	16	4	•
2.3	1	5	8	2	•
0.1	0	•	1	•	0
-2.-1	0	0	0	0	0
-4.-3	0	0	0	0	0

2195

Adak

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥34
16.17	•	•	•	0	0
14.15	•	•	•	•	0
12.13	•	1	1	•	•
10.11	1	3	2	•	•
8.9	2	11	8	1	•
6.7	6	23	16	3	•
4.5	3	9	6	1	•
2.3	1	1	1	•	0
0.1	•	•	•	0	0
-2.-1	•	0	0	0	0
-4.-3	0	0	0	0	0

6230

Marine Area A

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥34
16.17	•	•	0	0	0
14.15	•	•	0	0	0
12.13	1	2	•	•	0
10.11	1	3	1	•	0
8.9	2	4	4	1	0
6.7	2	9	10	2	•
4.5	4	11	11	2	0
2.3	2	8	10	2	0
0.1	•	1	2	0	0
-2.-1	•	•	•	•	0
-4.-3	0	0	•	0	0

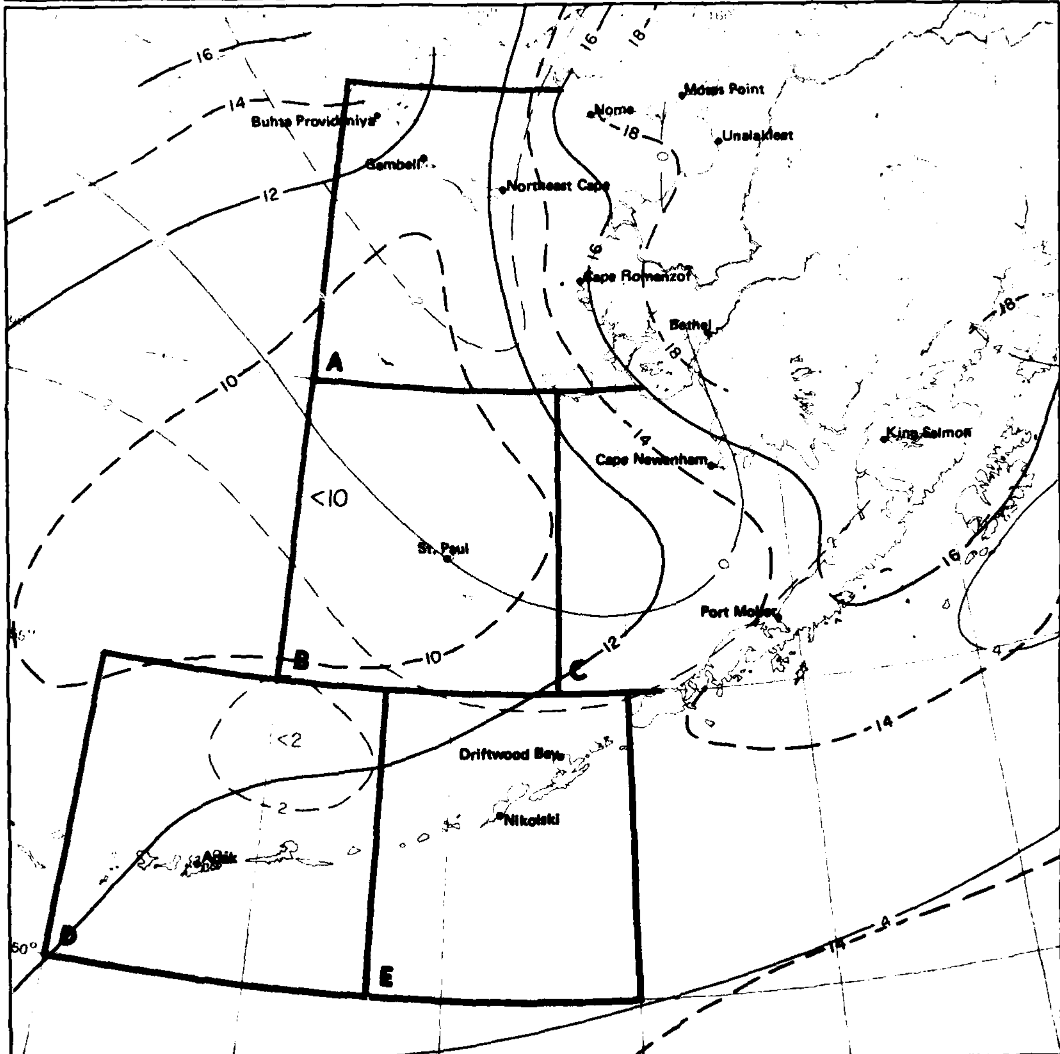
447

Marine Area B

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥34
12.13	•	•	•	0	[illegible]
10.11	•	1	1	•	[illegible]
8.9	1	4	3	1	•
6.7	3	13	15	3	[illegible]
4.5	3	13	16	3	•
2.3	1	5	[illegible]	1	•
0.1	•	1	2	•	•
-2.-1	[illegible]	•	•	•	0
-4.-3	[illegible]	[illegible]	0	0	0
-6.-5	[illegible]	[illegible]	0	0	0
-8.-7	0	0	0	0	0

2625



Marine Area C

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥34
18.19	•	•	[illegible]	[illegible]	[illegible]
16.17	•	•	•	0	[illegible]
14.15	•	•	•	•	0
12.13	1	1	•	•	•
10.11	2	3	1	•	•
8.9	3	8	5	1	•
6.7	4	14	11	2	•
4.5	2	10	11	2	•
2.3	1	4	•	1	•
0.1	•	1	2	1	•
[illegible]	•	•	•	•	•

7333

Marine Area D

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥34
16.17	•	•	•	0	0
14.15	•	•	•	0	0
12.13	•	1	•	•	0
10.11	1	2	1	•	•
8.9	2	8	7	2	•
6.7	4	18	23	5	•
4.5	1	7	10	3	•
2.3	•	•	1	•	•
0.1	0	•	•	•	0
-2.-1	0	0	0	•	0
-4.-3	0	0	0	0	0

7676

Marine Area E

WIND SPEED (KTS)

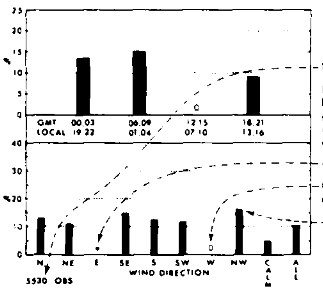
TEMP (°C)	0-3	4-10	11-21	22-33	≥34
18.19	0	•	0	0	0
16.17	•	•	•	0	0
14.15	•	•	•	•	0
12.13	1	1	1	•	0
10.11	1	4	3	•	•
8.9	3	12	12	2	•
6.7	4	16	13	6	1
4.5	1	4	5	2	•
2.3	•	•	•	•	•
0.1	0	•	•	•	0
-2.-1	•	0	0	0	0

6026

5 Air temperature extremes (°C)

June

Legend Fog/time and fog/wind direction



— Number of observations

— Bar graphs represent percent frequency of Fog (without precipitation) for various hour groupings and wind directions. Data are based on 100% for each hour-group and direction category

— • indicates < 0.5% but >0

— 0 indicates no fog occurred with the wind direction

— (Data show that 17% of all NW winds were accompanied by Fog (without precipitation).)

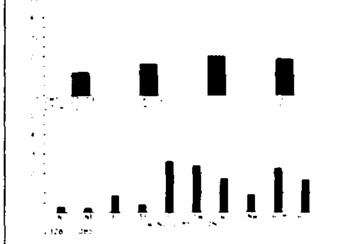
Map - Fog

BLACK LINE Percent frequency of occurrence of all fog

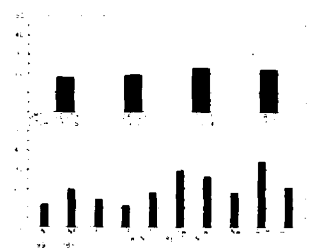
BLUE LINE Percent frequency of fog occurring without precipitation

The percent frequency of observations reporting fog with precipitation for a given point can be determined by computing the difference between the two analyses.

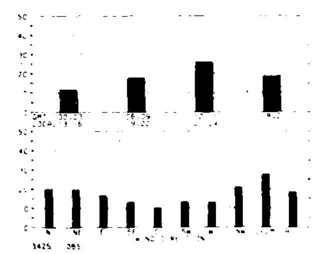
Buhta Provideniya



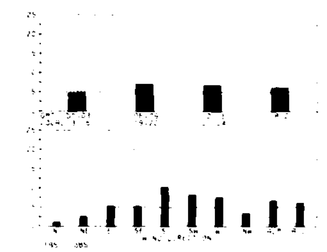
Gambell



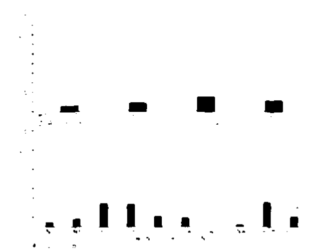
Northeast Cape



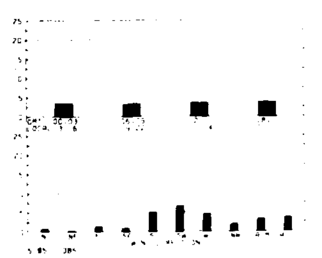
Nome



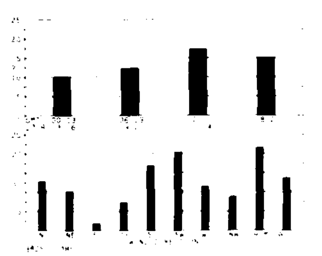
Moses Point



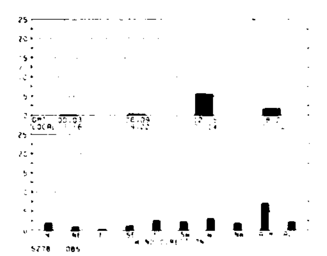
Unalakleet



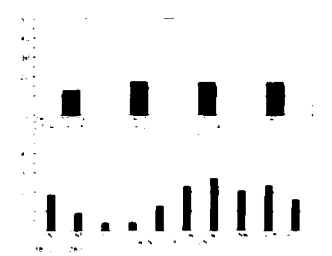
Cape Romanzof



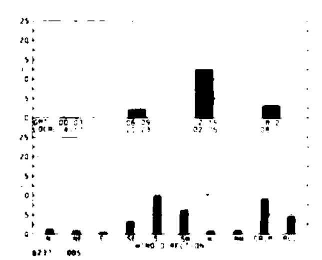
Bethel



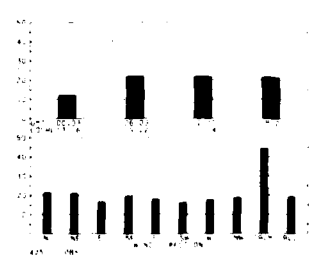
Cape Newenham



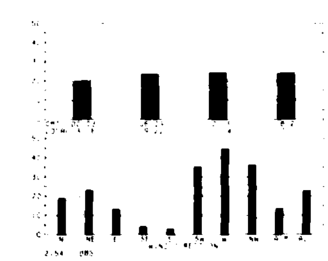
King Salmon



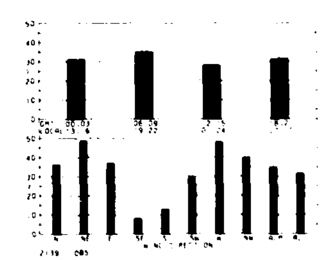
St. Paul

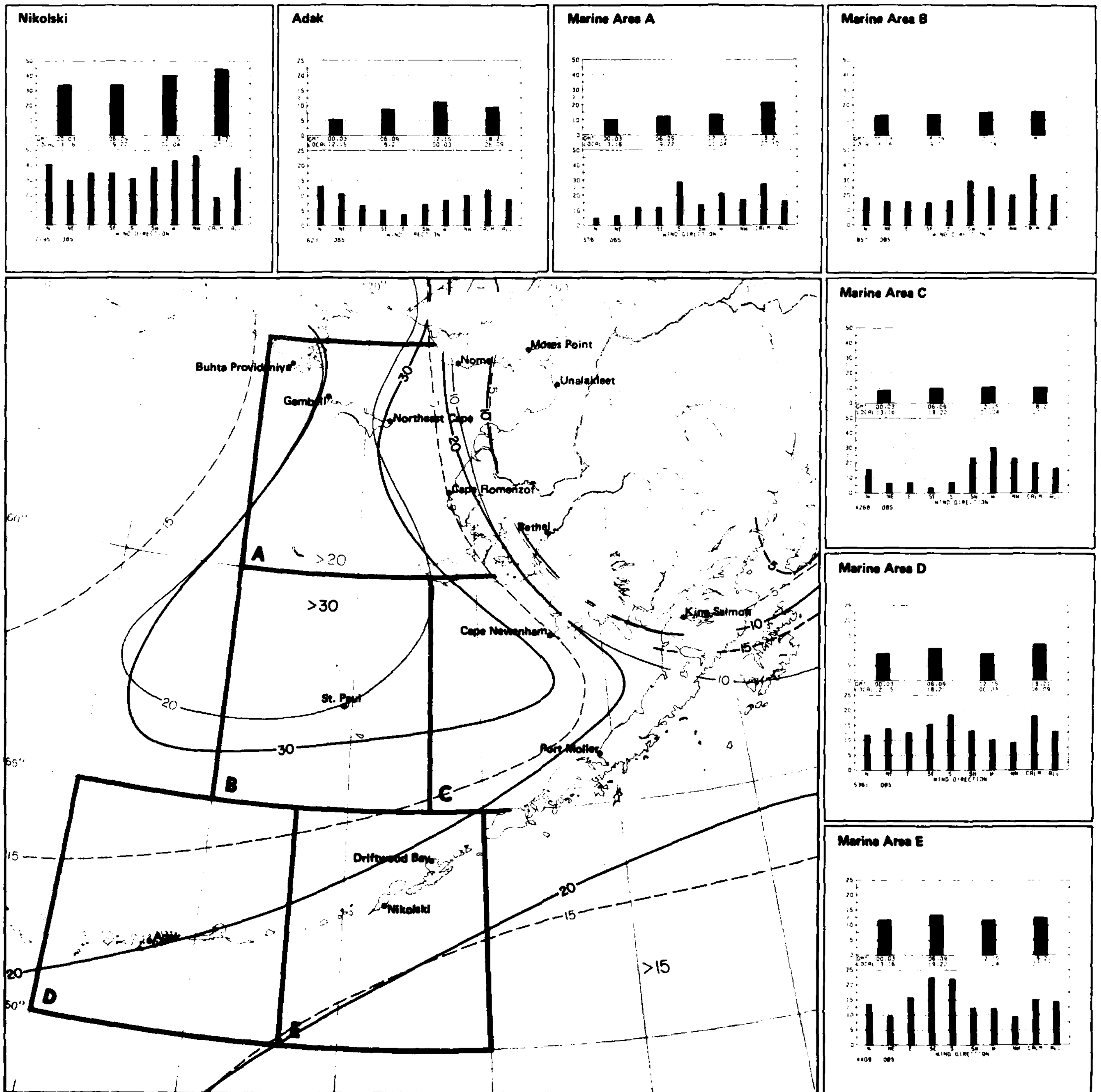


Port Moller



Driftwood Bay




Nikolski
Adak
Marine Area A
Marine Area B
Marine Area C
Marine Area D
Marine Area E
Buhta Providiniya
Gambell
Nome
Moses Point
Unalakleet
Northeast Cape
Cape Romenzof
Bethel
King Salmon
Cape Newenham
St. Paul
Port Moller
Driftwood Bay
Nikolski
Adak
A
B
C
D
E
>20
>30
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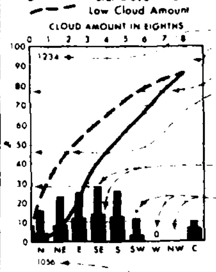
30
20
15
10
5

6 Fog

June

Legend

Cloud cover/wind direction



Total Cloud Amount / Low Cloud Amount — Cumulative percent frequency of indicated cloud amount equal to or less than the amount intersected by the curve

Number of total cloud observations

Obscurations

(77% of all total cloud amounts were ≤7/8)

(46% of all low cloud amounts were ≤2/8)

Low cloud amount. Percent frequency of observations from each direction and calm that were accompanied by low cloud amounts ≥5/8 and ≥7/8. Low clouds are clouds with bases <8000 feet

(28% of all SE winds were accompanied by low cloud amounts ≥5/8 and 14% by low cloud amounts ≥7/8)

An asterisk indicates that the percentage is based on 10-30 observations of wind direction, total and low cloud amount. 0 replaces bar graph when no low cloud amounts ≥5/8 were observed with a wind direction or calm. 0 or bar is omitted when number of observations of total and low cloud amount from a wind direction or calm is less than 10

Number of low cloud observations

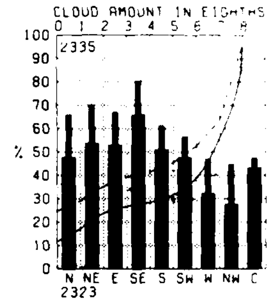
Map · Cloud amount thresholds

BLACK LINE Percent frequency of total cloud amount ≤2/8

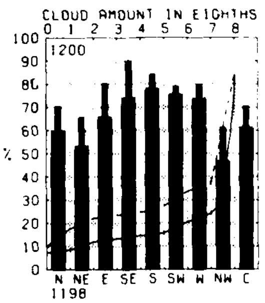
BLUE LINE Percent frequency of low cloud amount ≥5/8

Since the number of observations reporting low cloud amount is usually less than that for total cloud amount, somewhat different samples may be used to compute the two curves on the graph. This may lead to inconsistencies where low cloud amount appears higher than the total cloud amount. Where this occurred the graph was adjusted in favor of the total cloud by making the curves coincide. The frequency of obscured conditions may be determined by subtracting the cumulative percent frequency corresponding to 8/8 coverage from 100%.
In computing the bar graph, obscurations are considered as 8/8 coverage

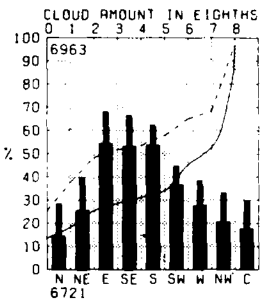
Buhta Provideniya



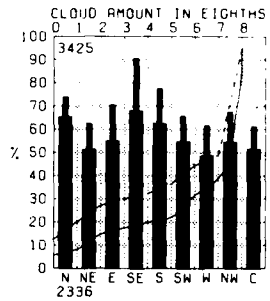
Gambell



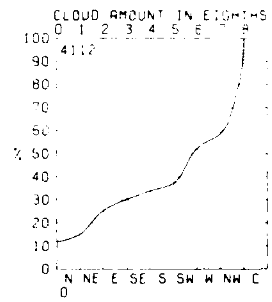
Northeast Cape



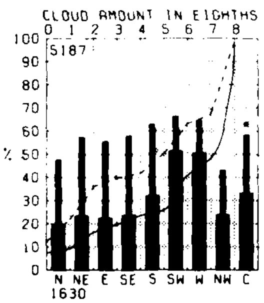
Nome



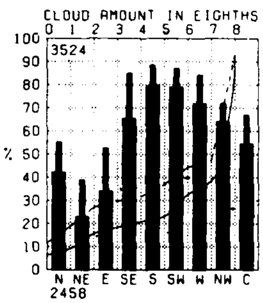
Moses Point



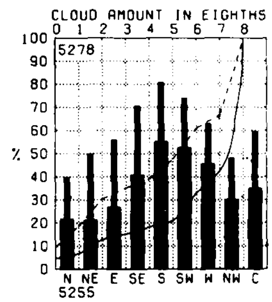
Unalakleet



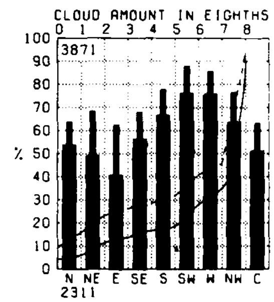
Cape Romanzof



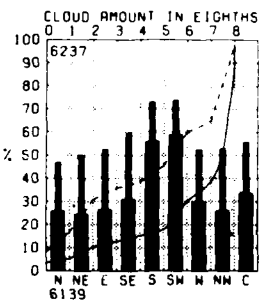
Bethel



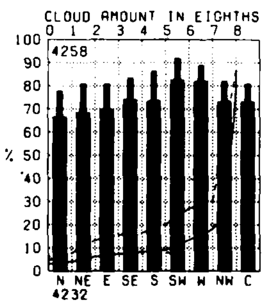
Cape Newenham



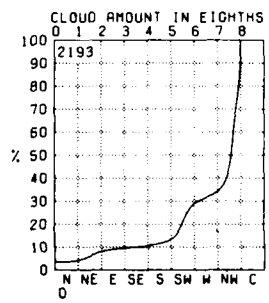
King Salmon



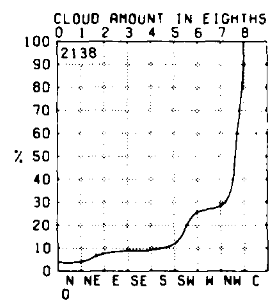
St. Paul

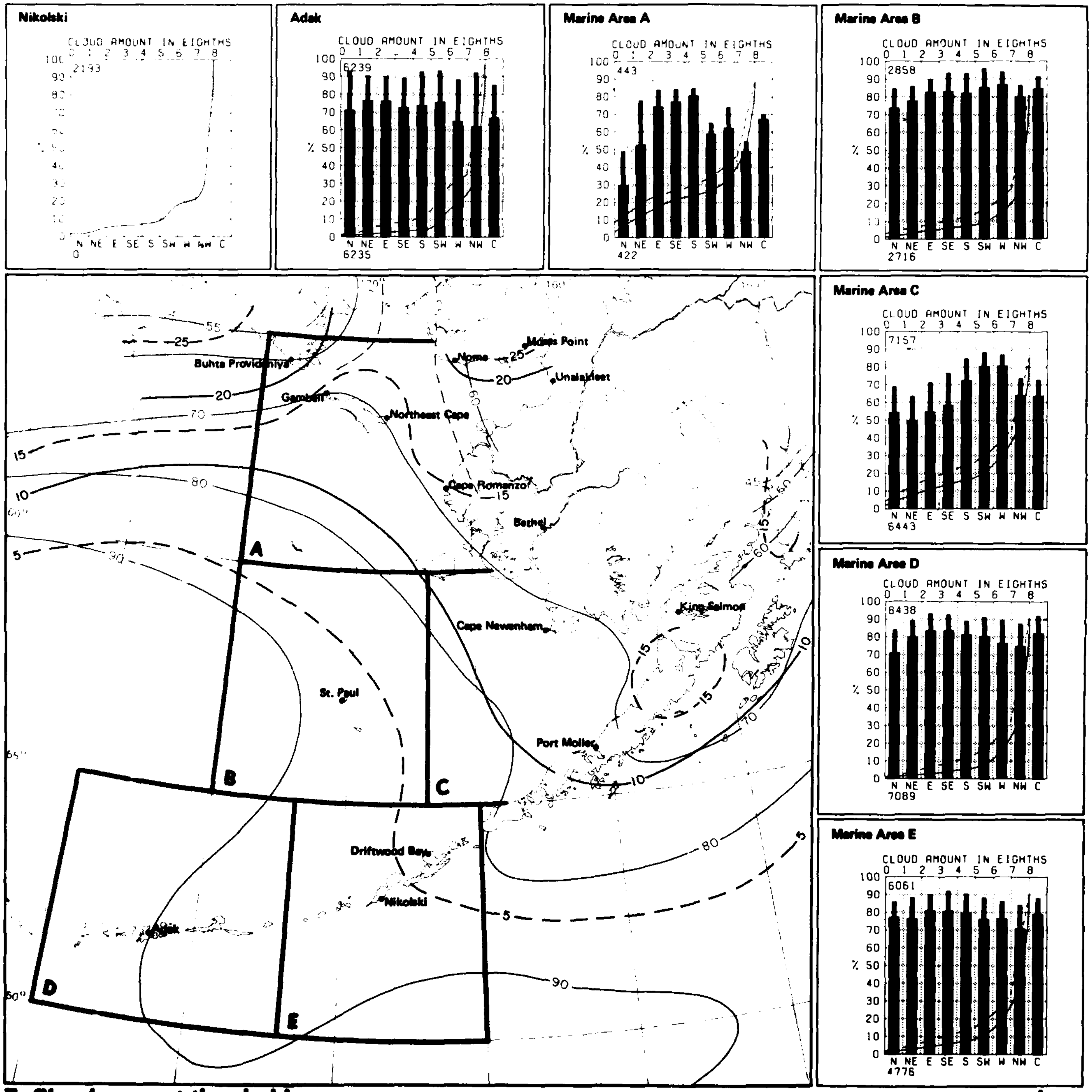


Port Moller



Driftwood Bay



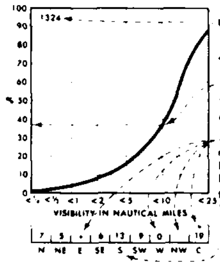


7 Cloud amount thresholds

June

Legend

Visibility/wind direction



Number of observations

Cumulative percent frequency of visibilities less than the visibility intersected by the curve

37% of all visibilities reported were <10 nautical miles

The table below the graph indicates percent frequency of occurrence of visibility <2 nautical miles versus wind direction

• indicates < 5% but >0. 0 indicates that no visibilities <2 nautical miles were observed with winds from a direction or calm. No percentage is given if less than 10 observations were available for visibility and wind direction. An asterisk indicates that the percentage was based on 10-30 observations of visibility and wind direction

13% of all S winds were accompanied by visibilities <2 nautical miles

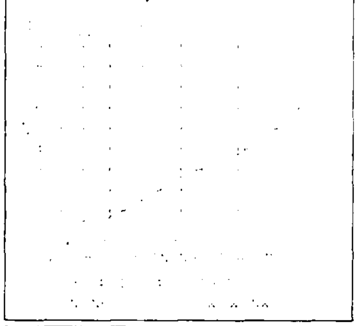
Map - Visibility thresholds

BLACK LINE Percent frequency of visibilities ≥5 nautical miles

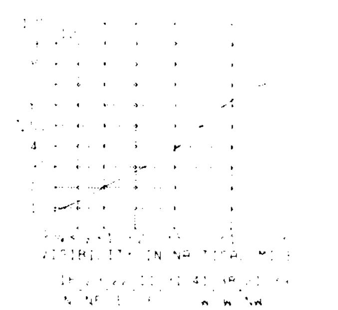
BLUE LINE Percent frequency of visibilities <2 nautical miles

The percentage of visibility equal to or greater than a given value can be obtained from the graph by subtracting the cumulative percent frequency of that value from 100%. Visibility at sea is difficult to measure because of the lack of reference points. Also, some observers seem to report reduced visibilities at night because of darkness, though this tendency has abated in recent years. The coarseness of the coding intervals, however, tends to minimize serious biases in the summarized data. Visibilities greater than 25 nmi should be interpreted cautiously because the earth's curvature makes it impossible to see 25 nmi horizontally from the bridges of most ships

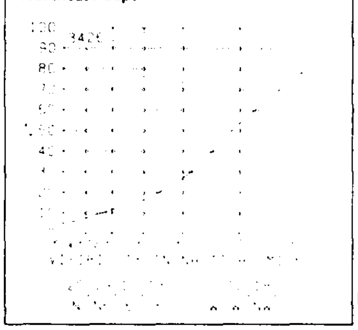
Buhta Provideniya



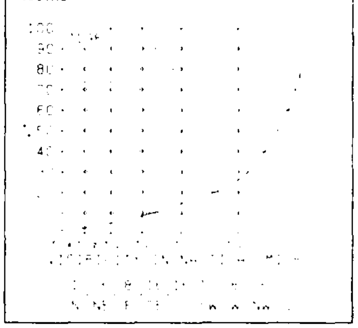
Gambell



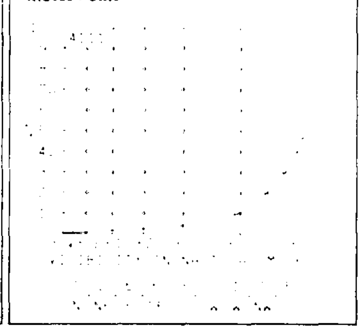
Northeast Cape



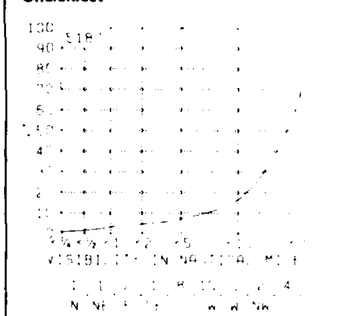
Nome



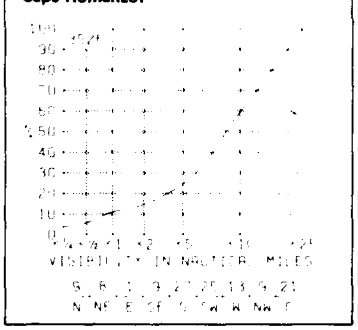
Moses Point



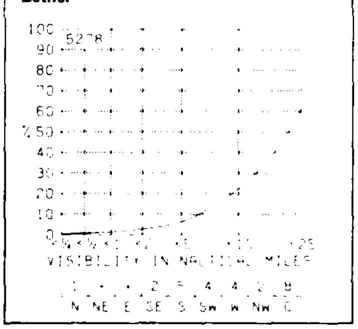
Unalakleet



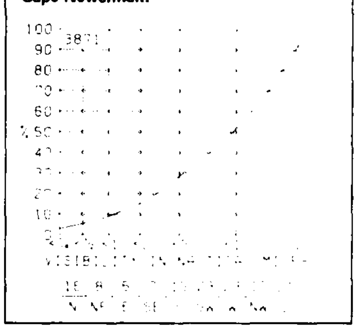
Cape Romanzof



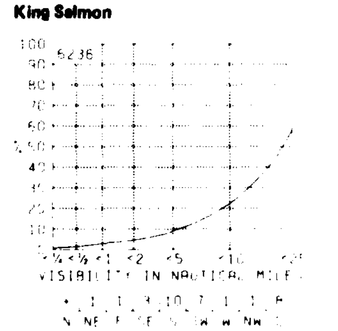
Bethel



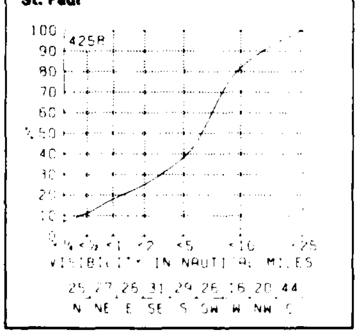
Cape Newenham



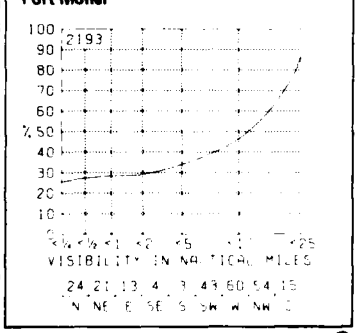
King Salmon



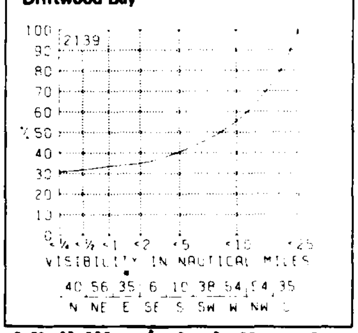
St. Paul

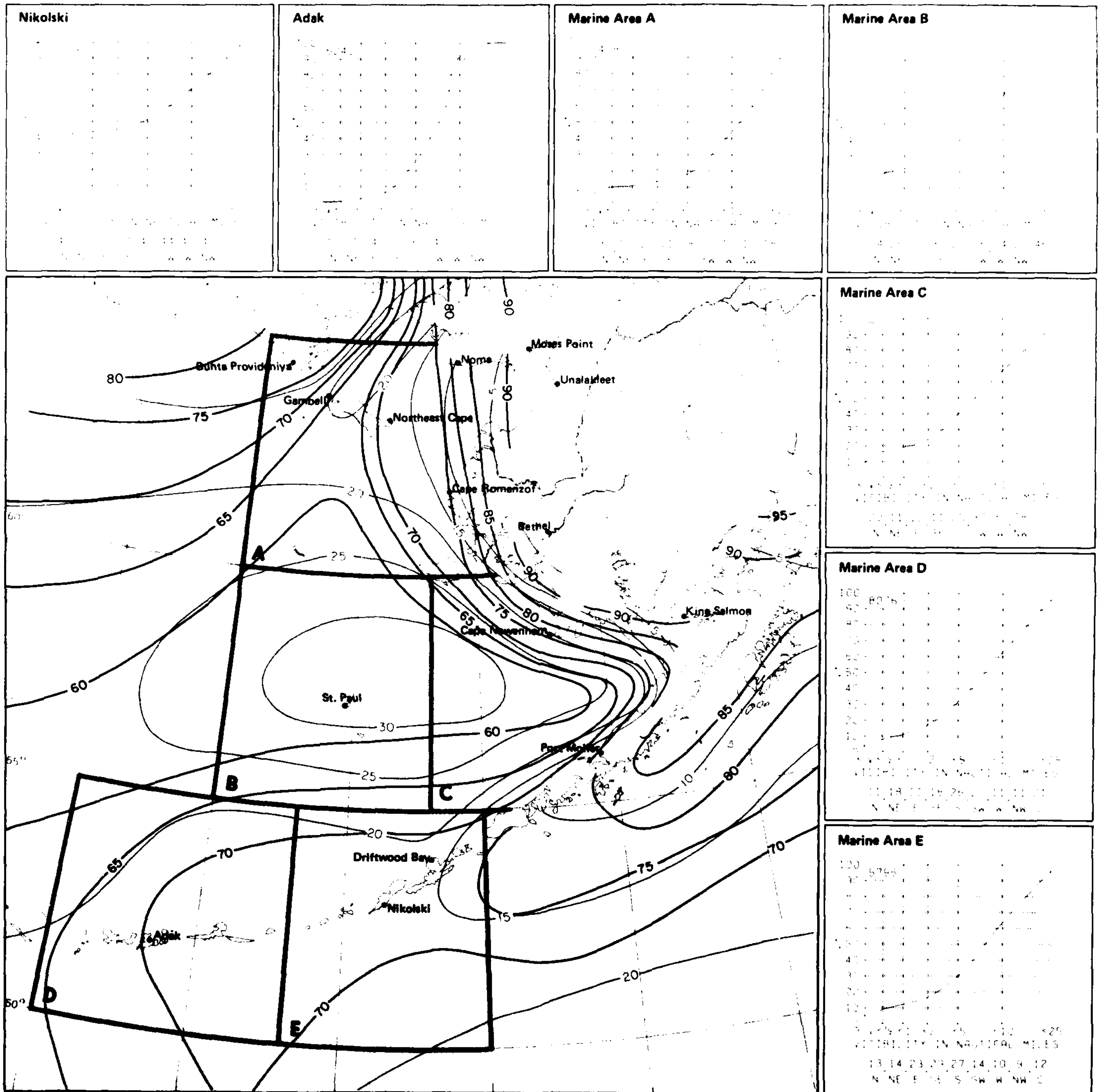


Port Moller



Driftwood Bay





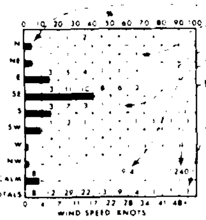
8 Visibility thresholds

June

Legend

Wind speed/direction

Direction frequency (top scale): Bars represent percent frequency of winds observed from each direction. Speed frequency (bottom scale): Printed figures represent percent frequency of wind speeds observed from each direction.



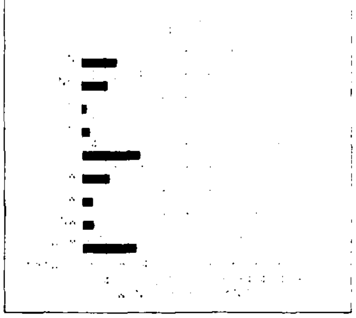
Map - Wind speed thresholds

BLACK LINE Percent frequency of wind speed ≤10 knots (≤12 mph)

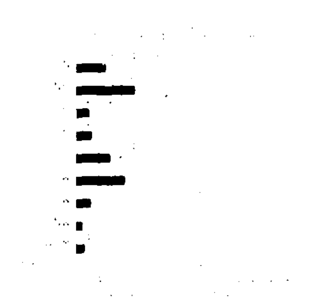
BLUE LINE Percent frequency of wind speed ≥34 knots (≥39 mph)

The scalar mean wind speed on the graph is based on the number of observations reporting a wind speed with direction. The sum of the totals line provides the cumulative percent frequency of wind speed below a selected threshold value. In the example graph, 71% of all winds were less than 17 knots (20 mph).

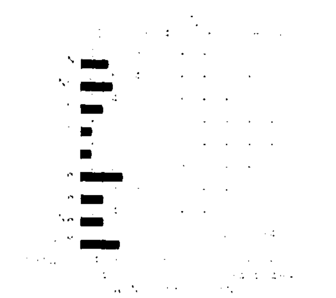
Buhta Provideniya



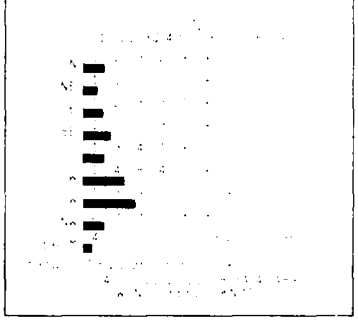
Gambell



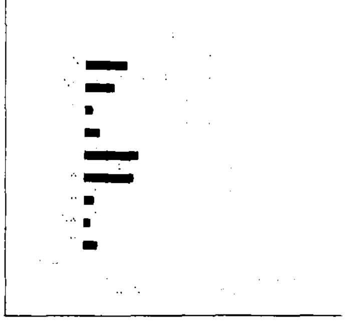
Northeast Cape



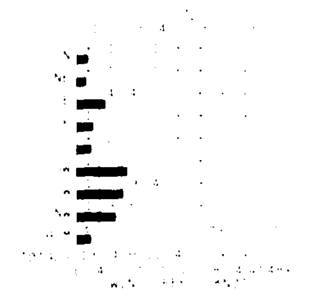
Nome



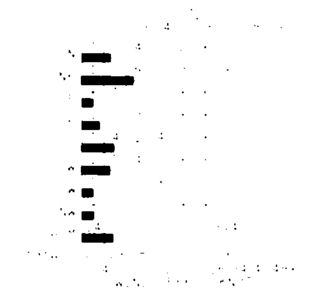
Moses Point



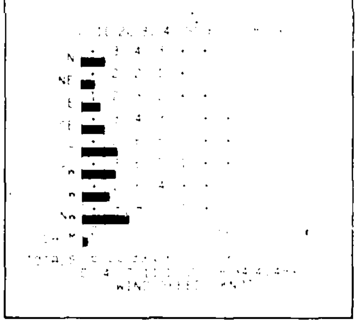
Unalakleet



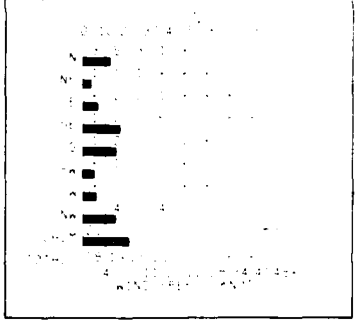
Cape Romanzof



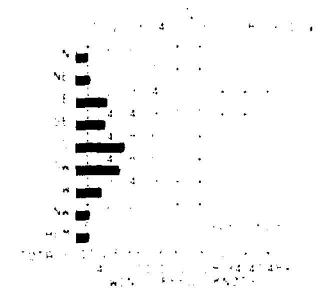
Bethel



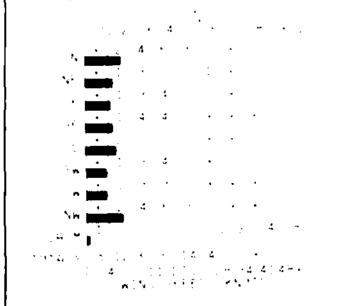
Cape Newenham



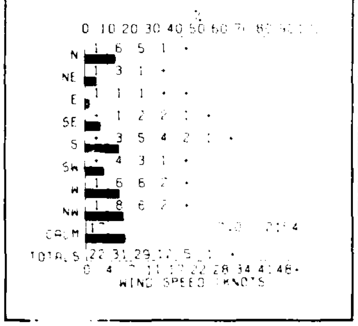
King Salmon



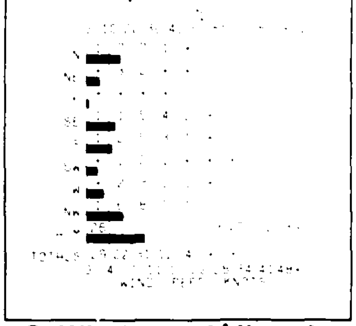
St. Paul

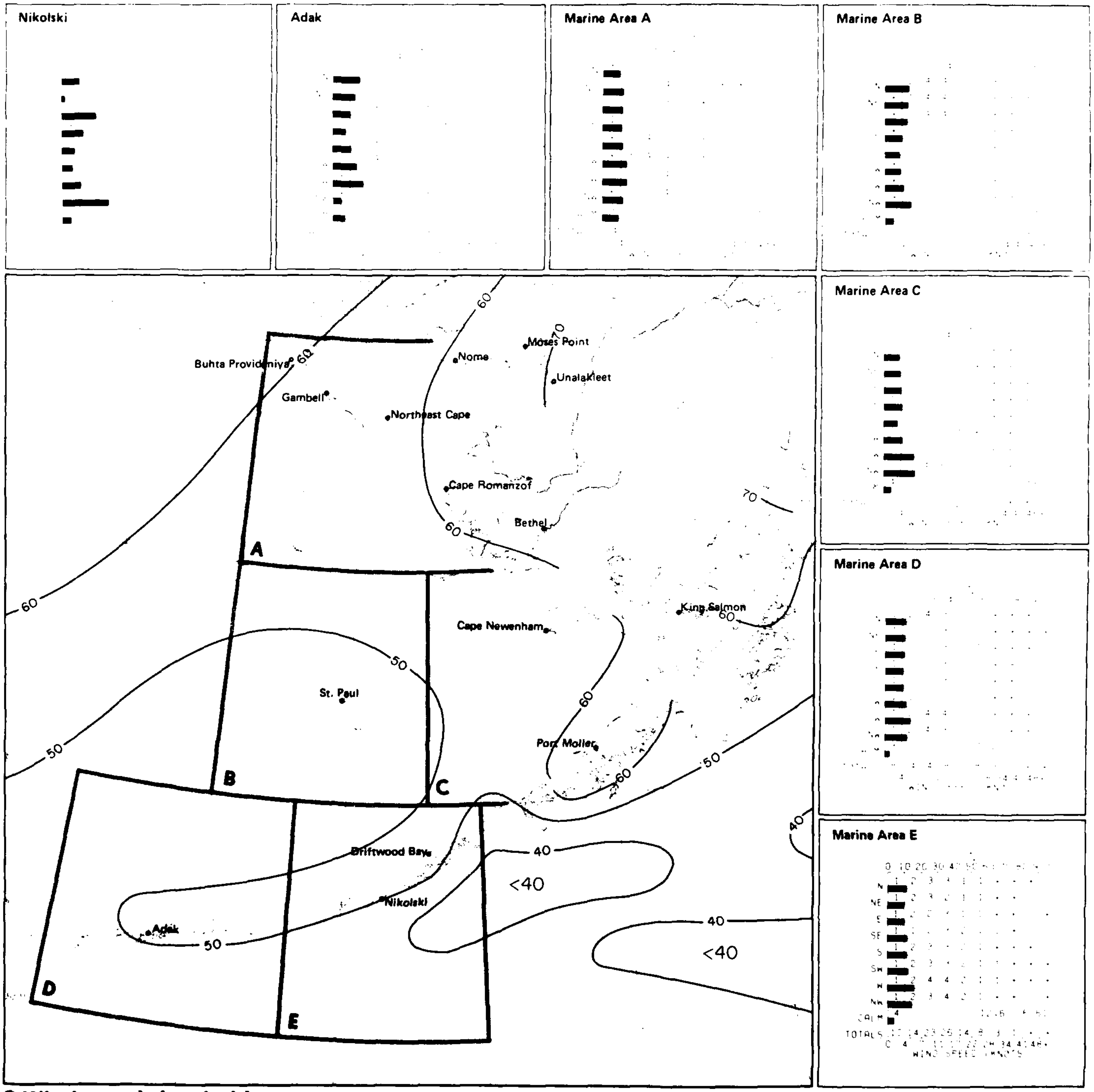


Port Moller



Driftwood Bay

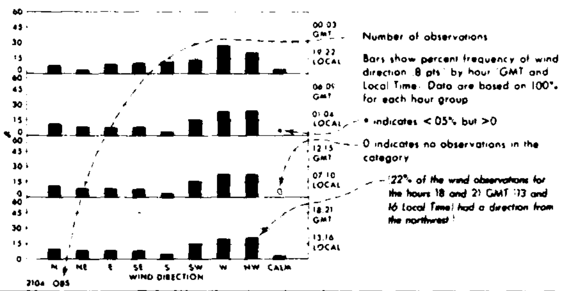




9 Wind speed thresholds

June

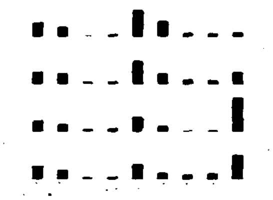
Legend — Wind direction/diurnal variation



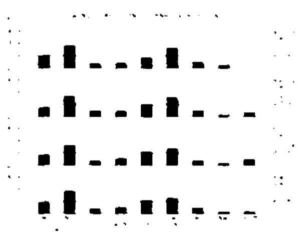
Map · Vector mean wind

10 2 Direction of flow toward station dot vector magnitude in knots example vector mean wind is from northeast at 10 2 knots or 11 7 mph

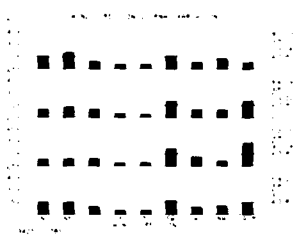
Buhta Providenrya



Gambell

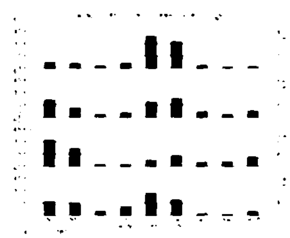


Northeast Cape

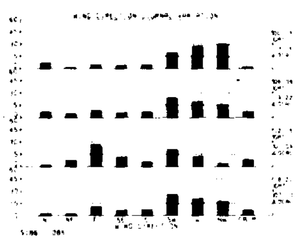


Nome

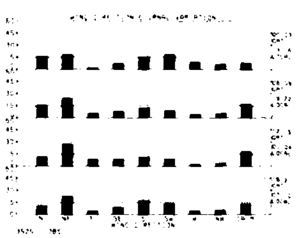
Moses Point



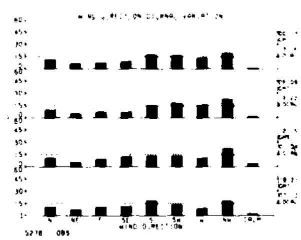
Unalakleet



Cape Romanzof

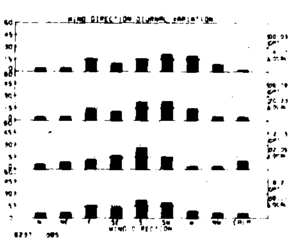


Bethel

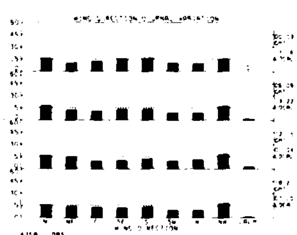


Cape Newenham

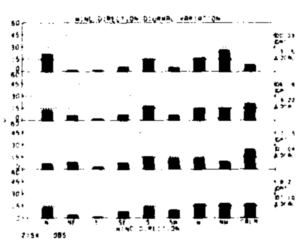
King Salmon



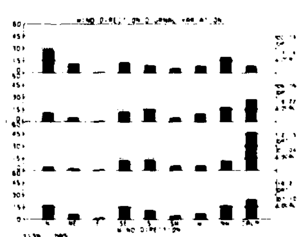
St. Paul

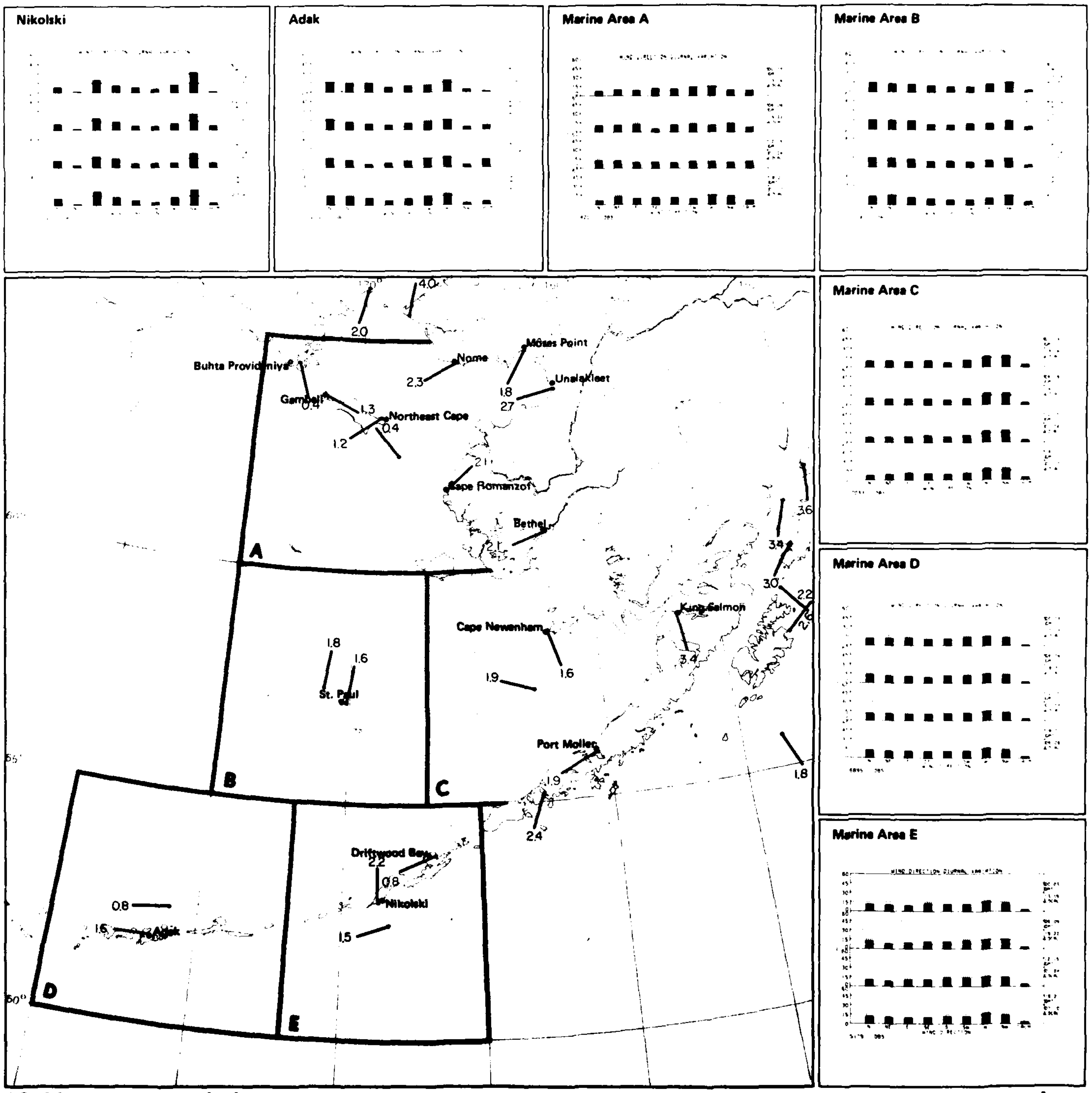


Port Moller



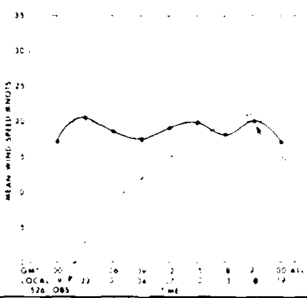
Driftwood Bay





10 Vector mean wind **June**

Legend — Wind speed/diurnal variation



· Number of observations

Mean wind speed knots by hour GMT and Local Time and for all hours

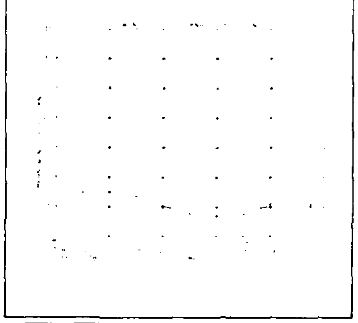
The mean wind speed for the hour 21 GMT 16 Local was 20 knots

Map - Scalar mean wind

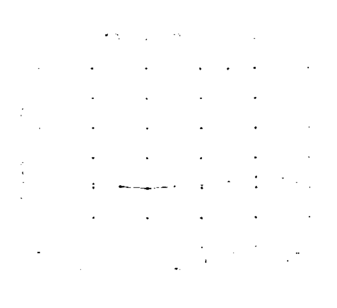
BLACK LINE Scalar mean wind knots

In areas of high persistence of direction the magnitude of the vector mean winds should closely approach that of the scalar mean winds. As most of the marine observations are recorded at six hour intervals disregard the plots for other than 00 06 12 18 GMT hours on the marine area graphs

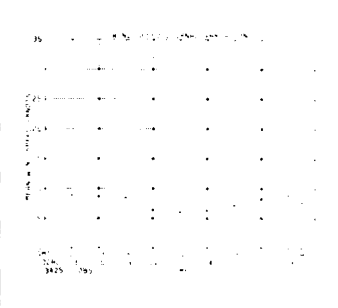
Buhta Provideniya



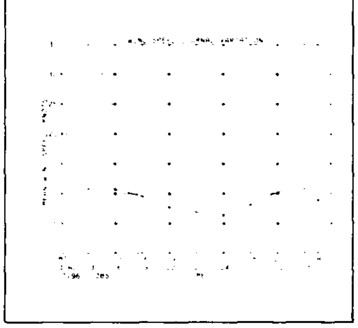
Gambell



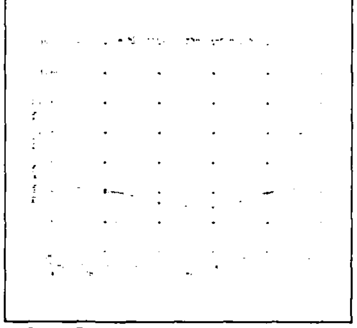
Northeast Cape



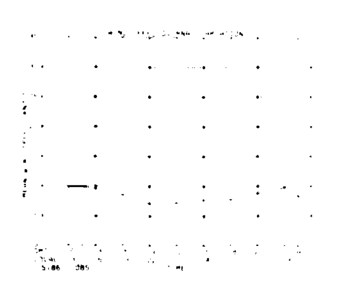
Nome



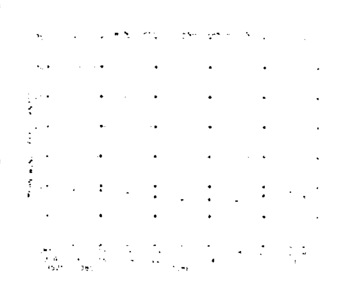
Moses Point



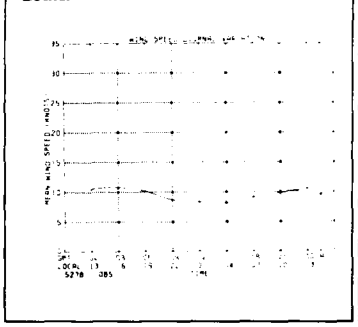
Unalakleet



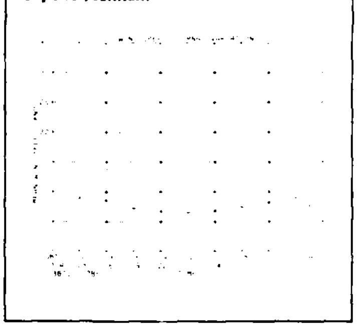
Cape Romanzof



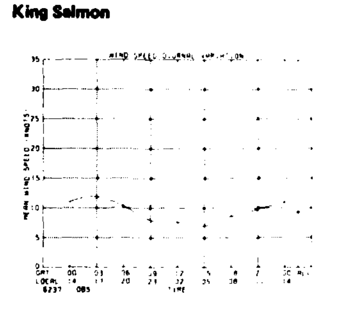
Bethel



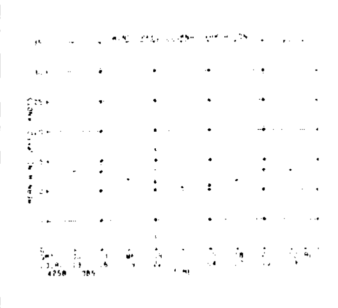
Cape Newenham



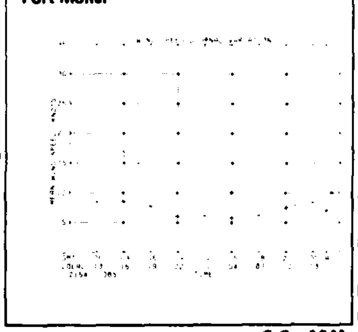
King Salmon



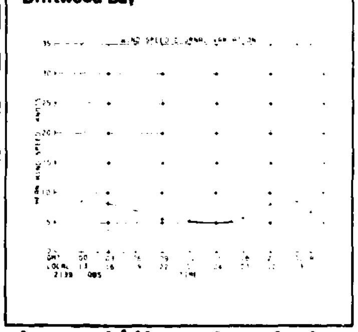
St. Paul

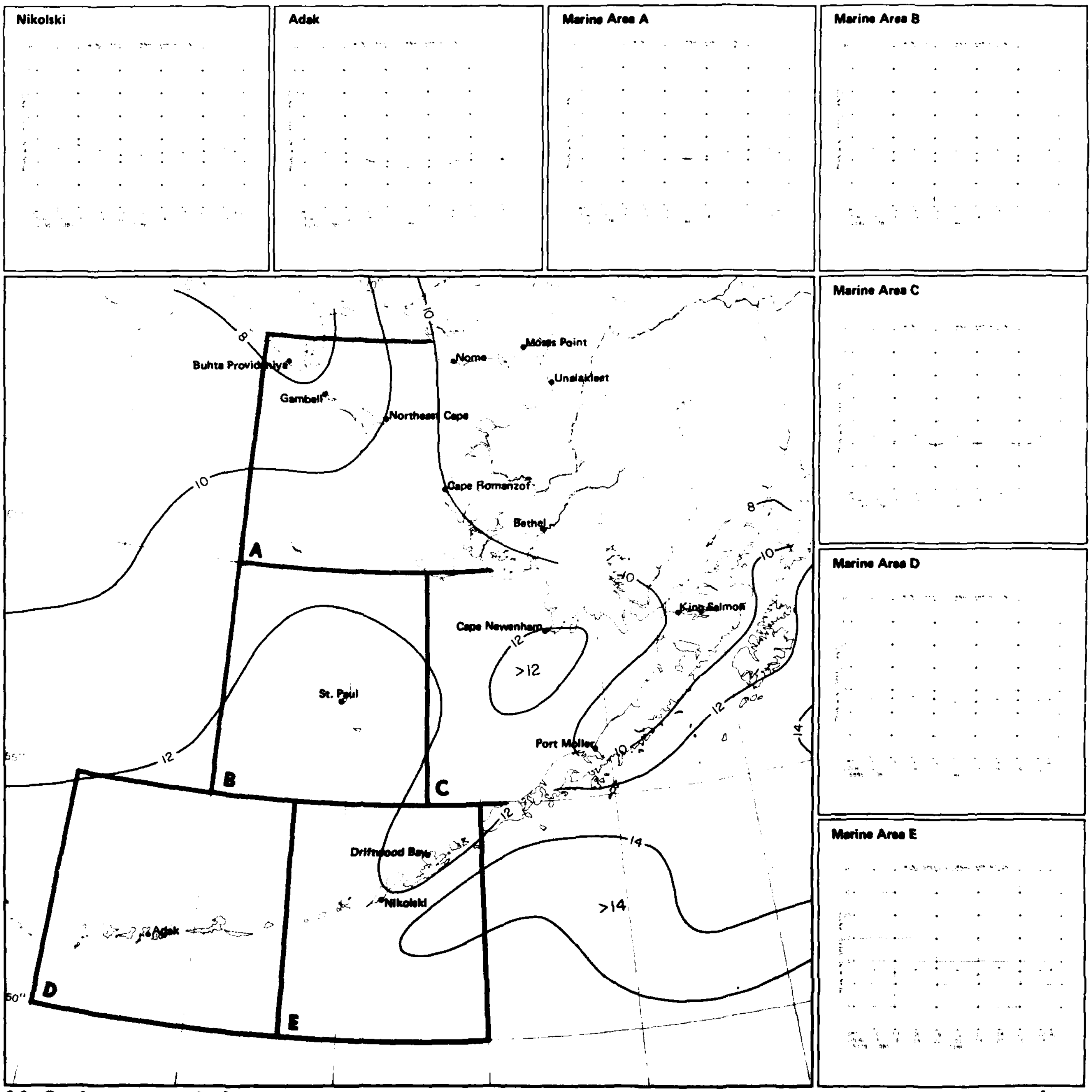


Port Moller



Driftwood Bay





11 Scalar mean wind **June**

Legend

Low cloud ceiling/visibility

VISIBILITY (LOW CLOUD CEILING)

	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	0	0	•	3	13	64
50<80	0	0	0	0	•	1
35<50	0	•	0	0	0	4
20<35	0	•	1	1	2	2
10<20	0	•	1	1	2	1
6<10	0	1	0	•	•	0
3<6	•	•	0	•	•	0
1.5<3	•	0	0	0	0	0
0<1.5	•	0	0	0	0	0
						334

Percent frequency of simultaneous occurrence of specified low cloud ceilings (hundreds of feet) and visibilities (nautical miles)

Low cloud ceiling heights are estimated from the height of low clouds (h) when low cloud amount (N_h) is ≥5/8

Obscurations are included under ceiling 0 <1.5

N C (no ceiling) includes bases of clouds ≥8000 feet as well as occurrences of N_h <5/8

(2% of all observations reported ceiling ≥1000 but <2000 feet simultaneously with visibility ≥5 but <10 nautical miles.)

• indicates < 5% but >0

Number of observations

Map · Low cloud ceiling and visibility thresholds

BLACK LINE Percent frequency of low cloud ceiling ≥1000 feet (or no low cloud ceiling) and visibility ≥5 nautical miles

BLUE LINE Percent frequency of low cloud ceiling <600 feet and or visibility <2 nautical miles

Buhta Providenya

	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
50<80	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
35<50	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
20<35	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
10<20	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
6<10	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3<6	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1.5<3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
0<1.5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Gambell

VISIBILITY (LOW CLOUD CEILING)

	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	1	•	•	•	4	22
50<80	0	0	•	0	•	2
35<50	0	0	0	•	0	1
20<35	•	0	0	•	1	2
10<20	0	•	•	1	3	4
6<10	•	•	1	4	9	5
3<6	•	1	4	5	7	2
1.5<3	•	1	1	•	•	•
0<1.5	12	4	1	•	0	0
						1198

Northeast Cape

VISIBILITY (LOW CLOUD CEILING)

	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	1	1	•	1	5	26
50<80	0	•	•	•	•	2
35<50	0	•	0	•	•	2
20<35	•	•	0	•	1	4
10<20	0	•	•	3	8	12
6<10	0	•	2	3	8	4
3<6	•	1	2	3	4	1
1.5<3	•	•	•	•	•	0
0<1.5	5	1	1	•	0	0
						2336

Nome

VISIBILITY (LOW CLOUD CEILING)

	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	•	•	•	•	2	54
50<80	•	•	0	•	•	4
35<50	•	0	0	•	•	3
20<35	0	0	•	•	1	5
10<20	•	•	•	1	3	4
6<10	•	•	1	2	4	2
3<6	•	1	2	3	2	1
1.5<3	•	•	•	•	•	•
0<1.5	2	1	•	•	•	0
						6721

Moses Point

VISIBILITY (LOW CLOUD CEILING)

	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	0	0	0	0	•	45
50<80	0	0	0	0	0	8
35<50	0	•	0	0	•	10
20<35	0	0	0	0	1	15
10<20	0	0	0	3	5	4
6<10	•	0	•	0	1	3
3<6	0	0	0	•	0	0
1.5<3	•	0	0	0	0	0
0<1.5	1	1	0	•	0	0
						239

Unalakleet

	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
50<80	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
35<50	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
20<35	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
10<20	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
6<10	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3<6	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1.5<3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
0<1.5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Cape Romanzof

VISIBILITY (LOW CLOUD CEILING)

	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	•	1	•	2	13	17
50<80	0	0	0	•	1	1
35<50	0	0	0	0	1	1
20<35	0	•	•	•	3	4
10<20	0	•	•	2	8	4
6<10	0	•	1	4	10	4
3<6	0	1	1	3	5	1
1.5<3	0	•	•	•	•	0
0<1.5	5	3	1	1	•	0
						2458

Bethel

VISIBILITY (LOW CLOUD CEILING)

	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	•	•	•	•	2	37
50<80	•	•	0	•	•	4
35<50	0	0	•	•	1	7
20<35	0	0	•	•	2	14
10<20	•	0	•	•	4	11
6<10	0	•	•	1	4	3
3<6	•	•	1	1	2	1
1.5<3	0	0	•	•	•	0
0<1.5	•	•	•	•	0	0
						5255

Cape Newenham

VISIBILITY (LOW CLOUD CEILING)

	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	•	•	1	1	8	20
50<80	•	•	0	•	•	1
35<50	0	0	0	0	•	1
20<35	•	0	•	•	2	3
10<20	•	•	•	2	4	5
6<10	0	•	1	4	7	7
3<6	•	•	3	7	6	3
1.5<3	0	•	•	1	•	•
0<1.5	6	2	2	1	•	0
						2311

King Salmon

VISIBILITY (LOW CLOUD CEILING)

	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	•	•	•	•	2	39
50<80	•	•	0	0	•	6
35<50	•	0	0	•	1	8
20<35	•	•	0	•	2	13
10<20	0	•	•	•	3	8
6<10	0	•	•	1	3	3
3<6	•	•	1	2	2	1
1.5<3	•	•	•	•	•	•
0<1.5	1	1	•	•	•	0
						6138

St. Paul

VISIBILITY (LOW CLOUD CEILING)

	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	1	•	•	1	9	7
50<80	0	0	0	0	1	•
35<50	•	0	0	•	1	1
20<35	•	•	0	•	4	3
10<20	•	•	•	1	13	5
6<10	•	•	1	3	7	1
3<6	1	2	4	8	8	1
1.5<3	•	1	1	1	•	•
0<1.5	9	3	1	•	•	0
						4232

Port Moller

Insufficient Data

Driftwood Bay

Insufficient Data

Nikolski

Insufficient Data

Adak

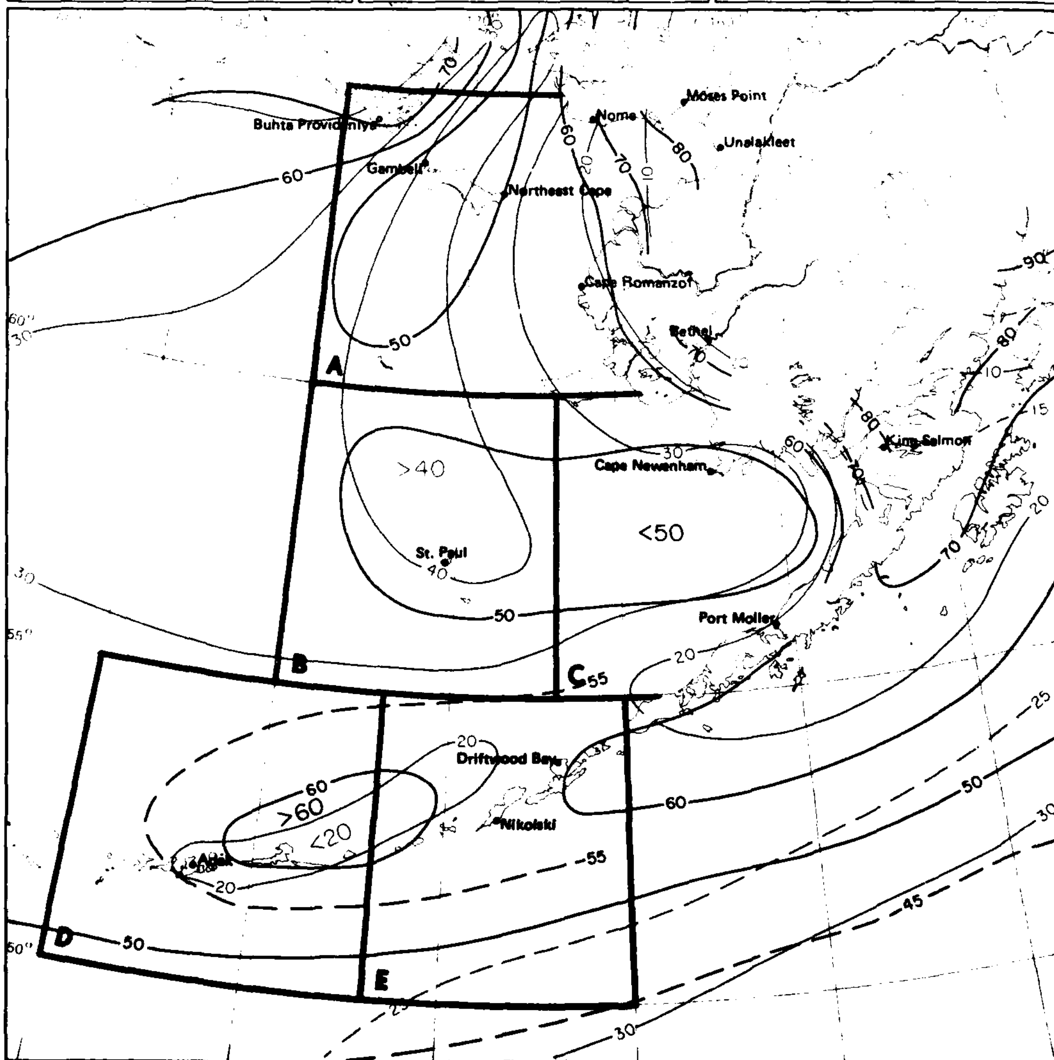
LOW CLOUD CEILING / VISIBILITY

	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	•	•	•	1	6	3
50<80	0	0	0	•	•	•
35<50	0	0	0	•	1	•
20<35	0	0	•	•	12	3
10<20	0	•	•	7	31	2
6<10	0	•	1	8	12	•
3<6	•	•	1	4	3	•
1.5<3	•	•	•	•	•	0
0<1.5	1	1	1	•	0	0

6235

Marine Area A

Marine Area B



Marine Area C

Marine Area D

Marine Area E

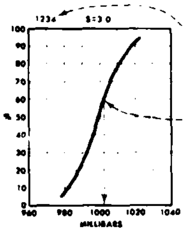
4440

12 Low cloud ceiling and visibility thresholds

June

Legend

Sea level pressure



Number of observations

Cumulative percent frequency of sea level pressures equal to or less than the pressure intersected by the curve

S - Standard deviation of pressure (mbs)

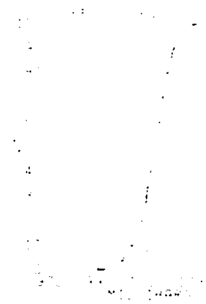
(60% of all observed sea level pressures were ≤1002 millibars)

Map - Mean sea level pressure

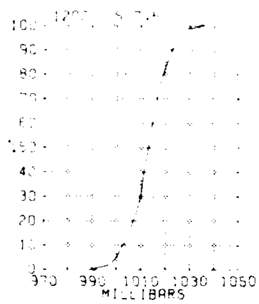
BLACK LINE Mean sea level pressure (millibars)

Sea level pressure is one of the most frequently recorded elements but one of the least accurate because of instrument and coding errors. Despite the inaccuracies of the individual readings, however, the large-scale patterns and mean gradients of the isopleth analyses are relatively accurate.

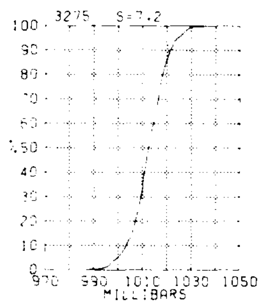
Buhta Provideniya



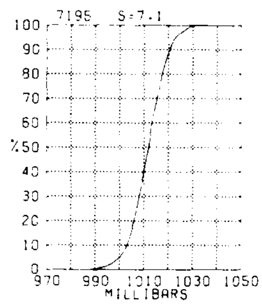
Gambell



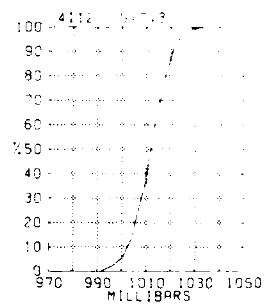
Northeast Cape



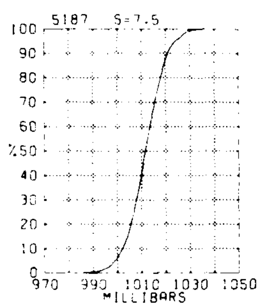
Nome



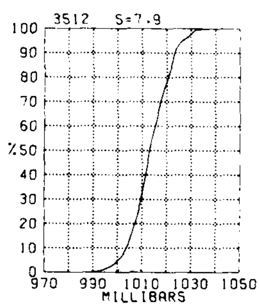
Moses Point



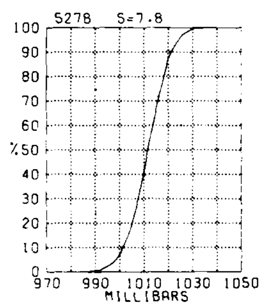
Unalakleet



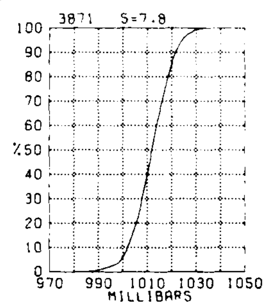
Cape Romanzof



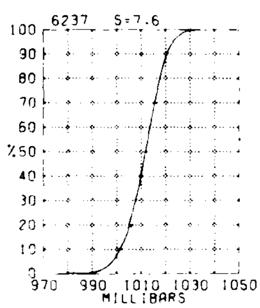
Bethel



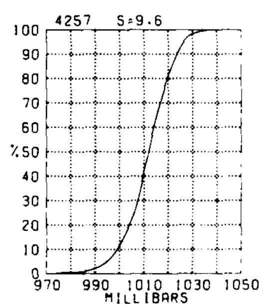
Cape Newenham



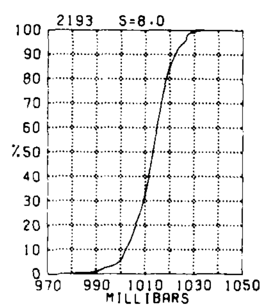
King Salmon



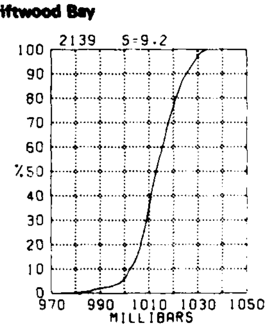
St. Paul

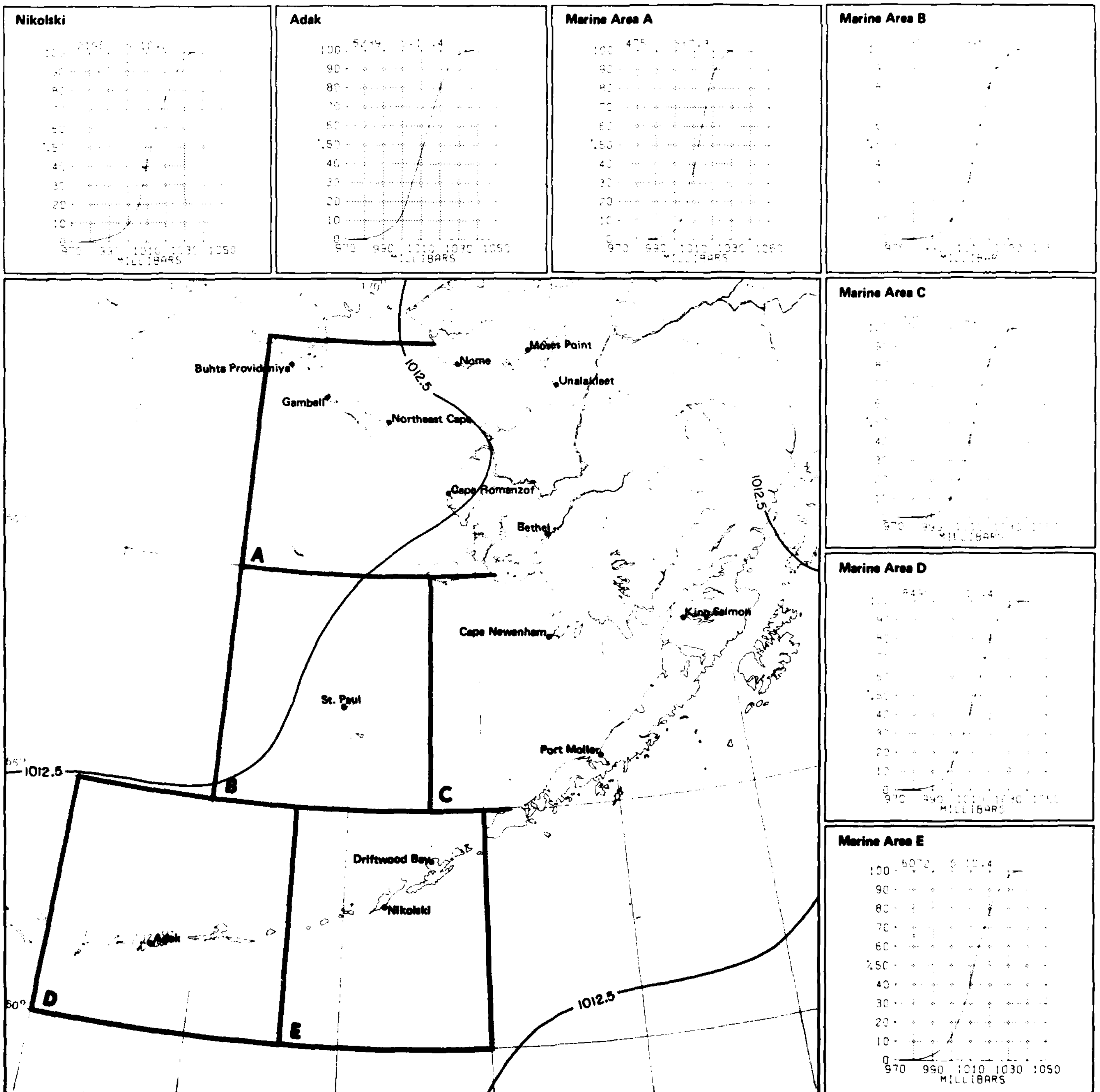


Port Moller

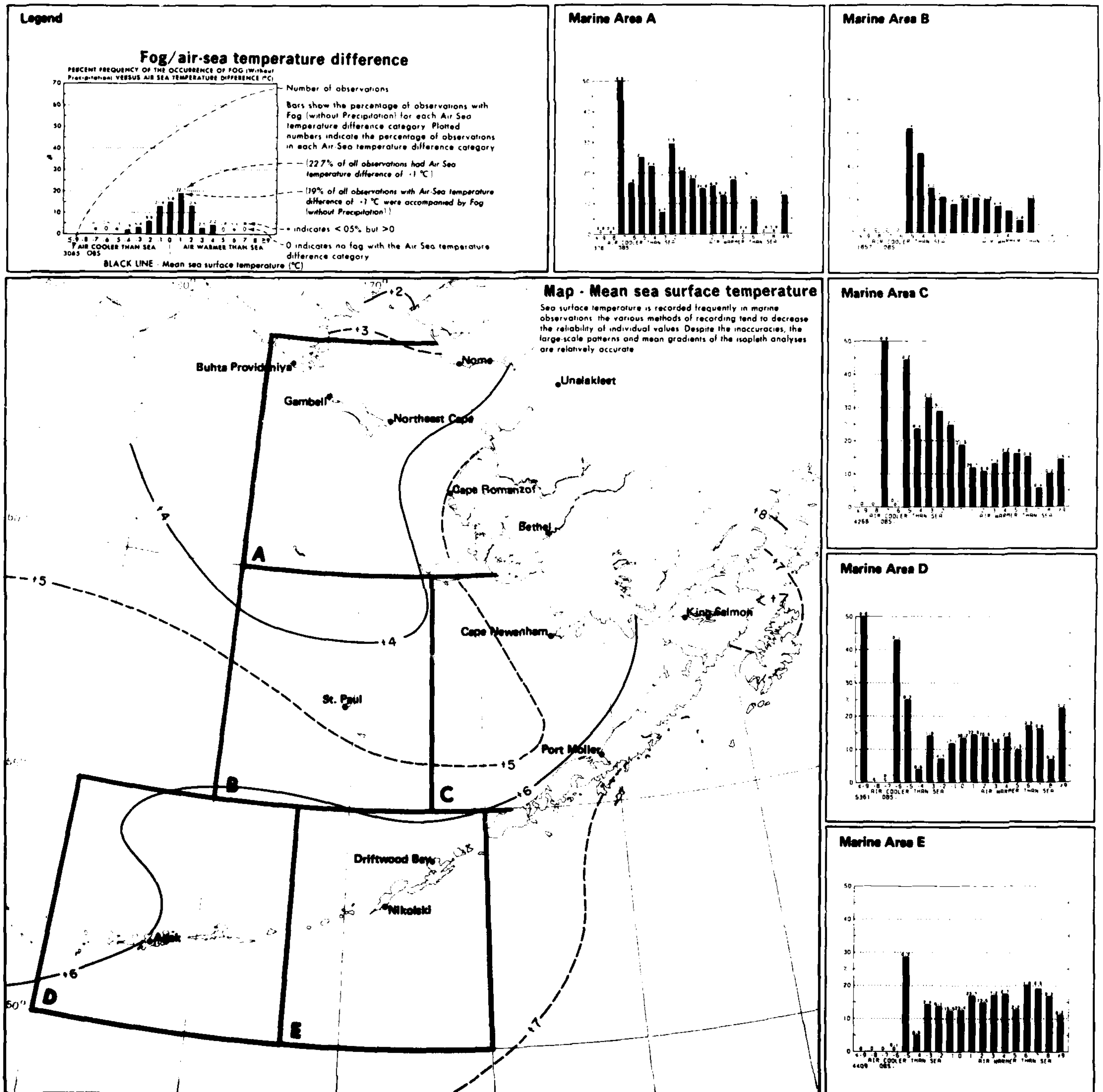


Driftwood Bay





13 Mean sea level pressure **June**

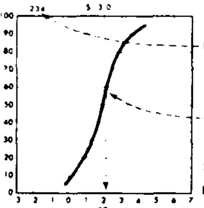


June

14 Fog/air-sea temperature difference
Mean sea surface temperature

Legend

Sea surface temperature



Number of observations

Cumulative percent frequency of sea surface temperatures equal to or less than the temperature intersected by the curve

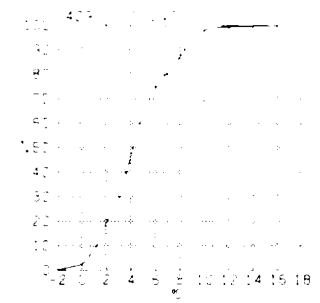
(60% of all observed sea surface temperatures were ≤2.1°C or ≤35.8°F)

S Standard deviation of sea surface temperatures (°C)

BLACK LINE Maximum (99%) sea surface temperature (°C) (1% of the temperatures were greater than the given value)

BLUE LINE Minimum (1%) sea surface temperature (°C) (1% of the temperatures were equal to or less than the given value)

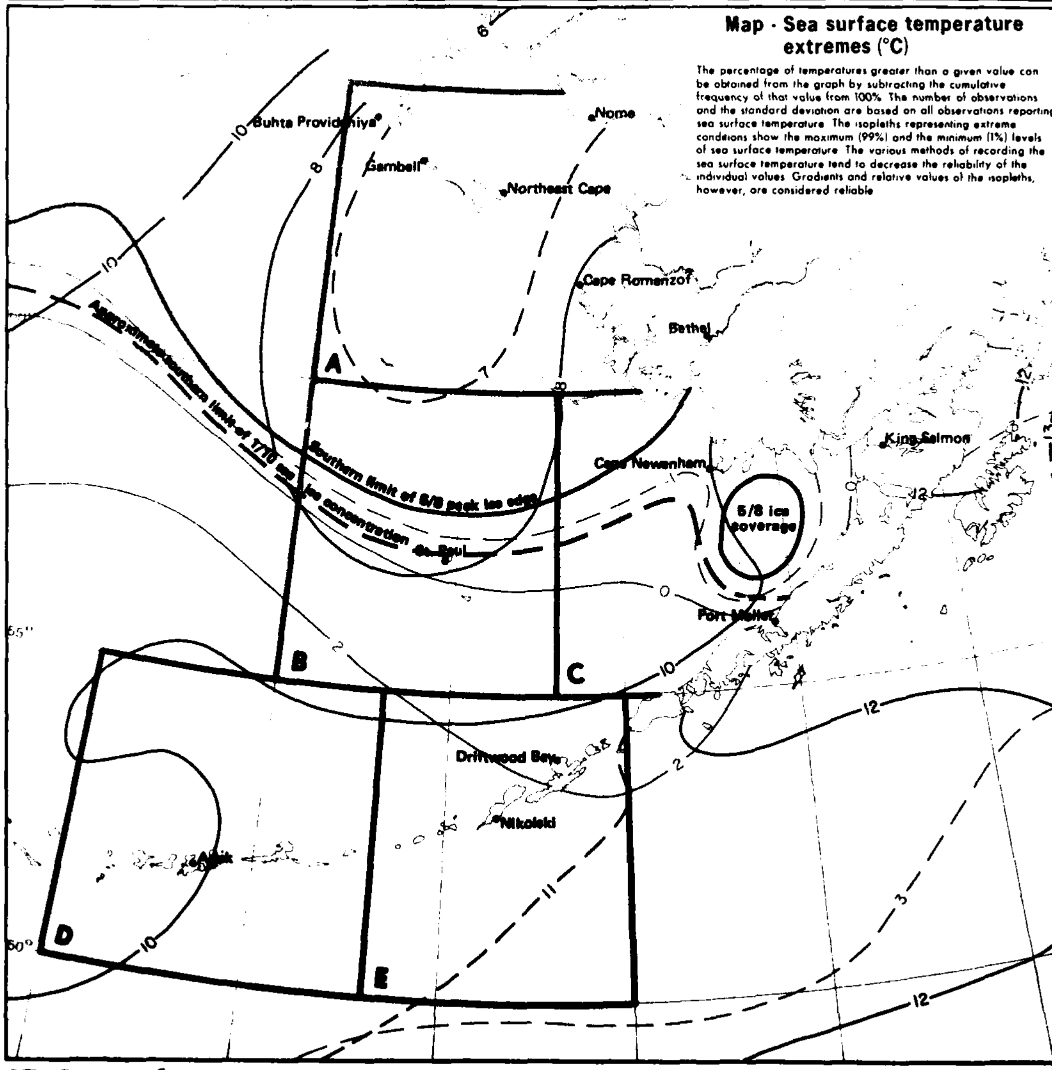
Marine Area A



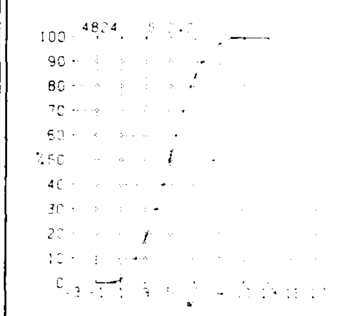
Marine Area B

Map - Sea surface temperature extremes (°C)

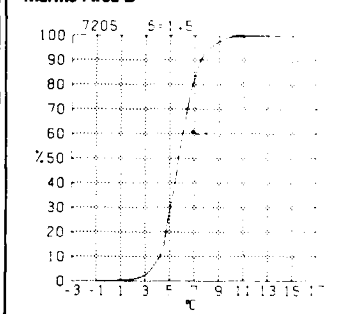
The percentage of temperatures greater than a given value can be obtained from the graph by subtracting the cumulative frequency of that value from 100%. The number of observations and the standard deviation are based on all observations reporting sea surface temperature. The isopleths representing extreme conditions show the maximum (99%) and the minimum (1%) levels of sea surface temperature. The various methods of recording the sea surface temperature tend to decrease the reliability of the individual values. Gradients and relative values of the isopleths, however, are considered reliable.



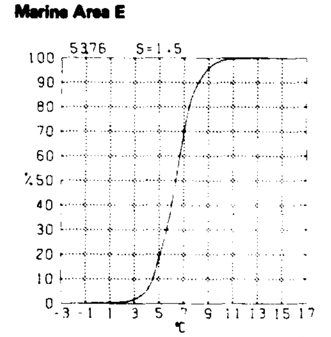
Marine Area C



Marine Area D



Marine Area E



15 Sea surface temperature extremes

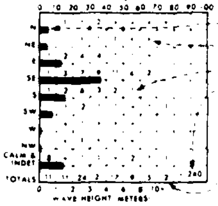
June

Legend

Wave height/direction

Direction frequency (top scale) Bars represent percent frequency of waves from each direction

Height frequency (bottom scale) Printed figures represent percent frequency of wave heights observed from each direction



(5% of all waves were from the N)

· indicates < 5% but >0

(1% of all waves were from the S with heights from 6-7.5 meters)

Number of observations

(2% of the waves from all directions had heights ≥10 meters)

WAVE HEIGHT INTERVAL

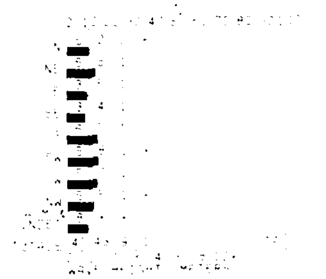
Feet	0-2	3-6	7-9	10-12	13-19	20-25	26-32	≥33
Meters	0-.5	1-1.5	2-2.5	3-3.5	4-5.5	6-7.5	8-9.5	≥10
	0	1	2	3	4	6	8	10+

Printed scale on bottom of chart

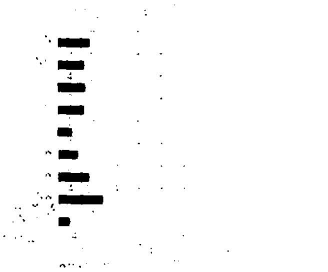
BLACK LINE Percent frequency of wave height <1.5 meters (<5 feet)

BLUE LINE Percent frequency of wave height <2.5 meters (<8 feet)

Marine Area A

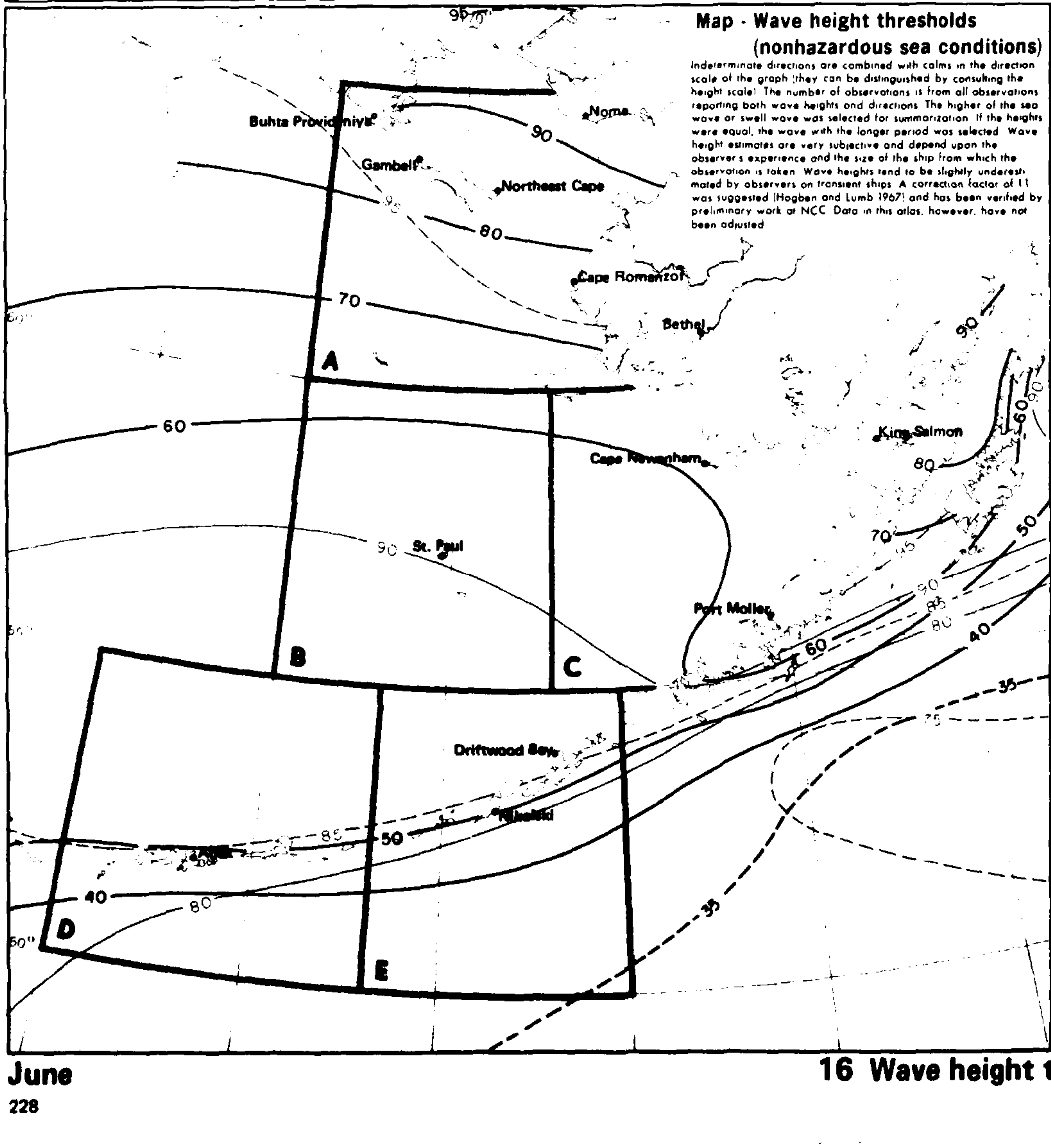


Marine Area B

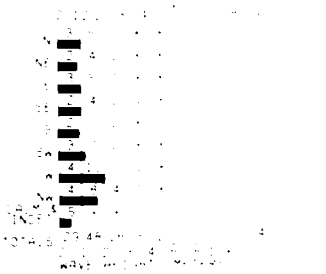


Map - Wave height thresholds (nonhazardous sea conditions)

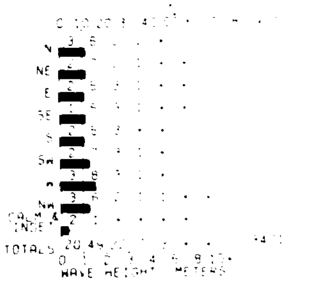
Indeterminate directions are combined with calms in the direction scale of the graph (they can be distinguished by consulting the height scale) The number of observations is from all observations reporting both wave heights and directions The higher of the sea wave or swell wave was selected for summarization If the heights were equal, the wave with the longer period was selected Wave height estimates are very subjective and depend upon the observer's experience and the size of the ship from which the observation is taken Wave heights tend to be slightly underestimated by observers on transient ships A correction factor of 1.1 was suggested (Hogben and Lumb 1967) and has been verified by preliminary work at NCC Data in this atlas, however, have not been adjusted



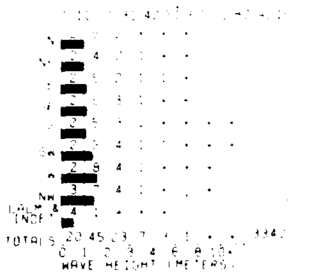
Marine Area C



Marine Area D



Marine Area E

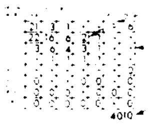


June

16 Wave height thresholds (nonhazardous)

Legend

Wave height/period



Percent frequency of occurrence of wave period and height

2% of observed waves had a height of 1 1.5 meters and a period of 10 11 seconds

indicates < 5% but >0

Number of observations

Waves are selected on the basis of the higher of sea and swell when both are reported. If both heights are equal the wave with the longer period is selected.

BLACK LINE Percent frequency of wave height ≥3.5 meters (≥12 feet)

BLUE LINE Percent frequency of wave height ≥6 meters (≥20 feet)

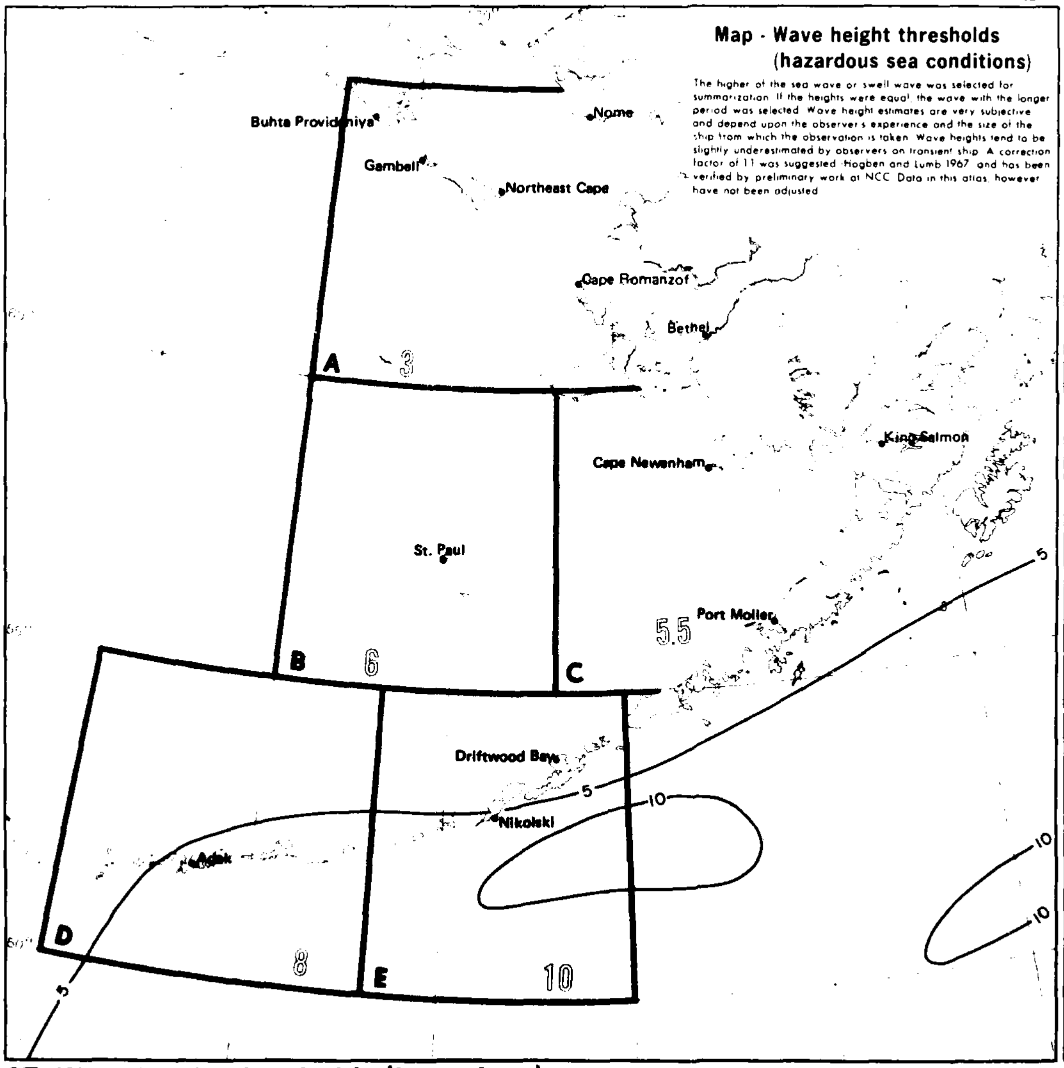
BLUE NUMBER Maximum observed wave height meters

Marine Area A

Marine Area B

Map - Wave height thresholds (hazardous sea conditions)

The higher of the sea wave or swell wave was selected for summarization. If the heights were equal, the wave with the longer period was selected. Wave height estimates are very subjective and depend upon the observer's experience and the size of the ship from which the observation is taken. Wave heights tend to be slightly underestimated by observers on transient ship. A correction factor of 1.1 was suggested (Hogben and Lumb 1967) and has been verified by preliminary work at NCC. Data in this atlas, however have not been adjusted.



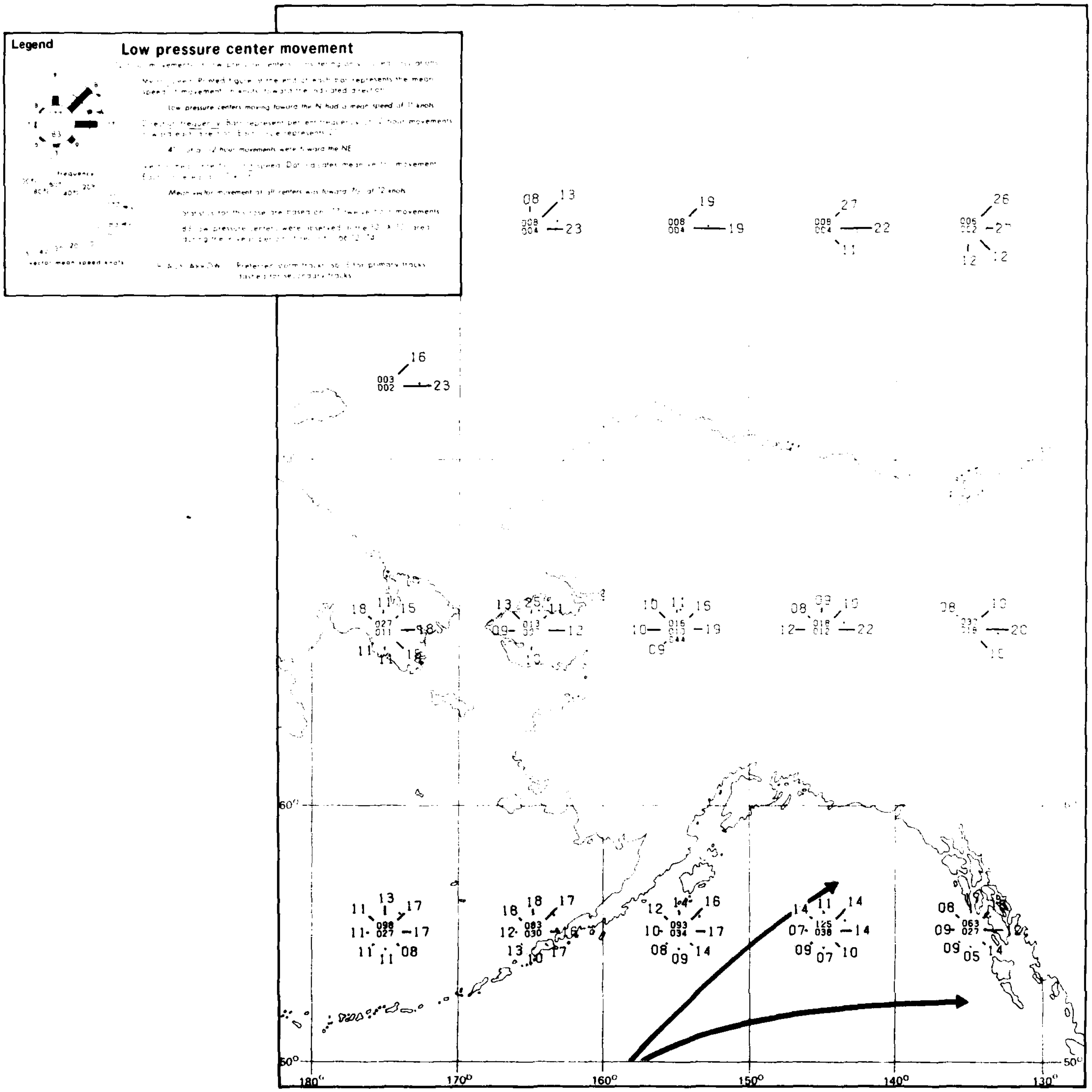
Marine Area C

Marine Area D

Marine Area E

17 Wave height thresholds (hazardous)

June

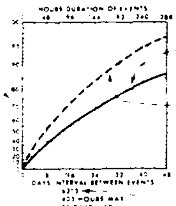


June

18 Low pressure center movement

Legend

Persistence of visibility <2 n. mi.



Hours duration of events Days interval between events

Cumulative percent frequency of hours duration equal to or less than the number of hours intersected by the solid curve

80% of the events had a duration ≤216 hours

Cumulative percent frequency of days interval between events equal to or less than the number of days intersected by the broken curve

88% of the events were followed by another event in 28 days or less

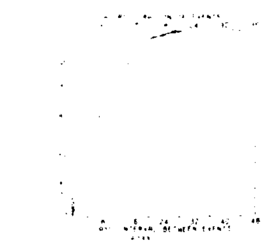
The maximum value(s) of hours duration and/or the days interval will be displayed when the graph limits are exceeded

Durations and intervals for a particular month extend from the time they begin (or the first of the month if already in progress) and are terminated at the actual ending time, regardless of what month that may be

Number of observations

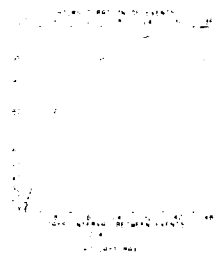
Top and bottom scales are variable to allow for variations in the data

Adak



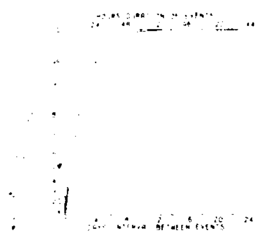
Nome

Moses Point

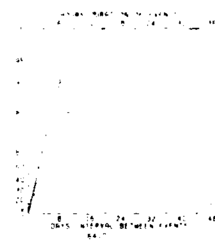


Unalakleet

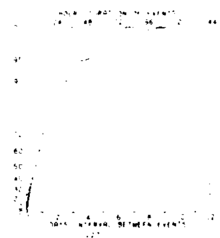
Cape Romanzof



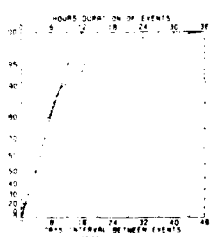
Bethel



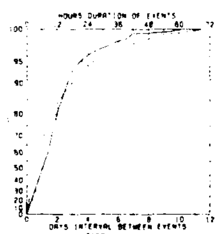
Nikolski



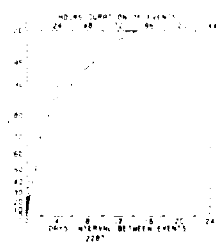
King Salmon



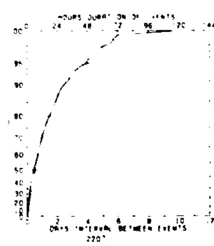
St. Paul



Port Moller



Driftwood Bay

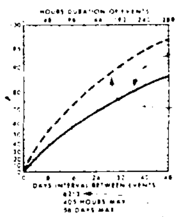


19 Persistence of visibility <2 n. mi. **June**

Legend

Persistence of wind ≥10 kts.

Hours duration of events   Days interval between events



Cumulative percent frequency of hours duration equal to or less than the number of hours intersected by the solid curve

— *80% of the events had a duration ≤216 hours*

Cumulative percent frequency of days interval between events equal to or less than the number of days intersected by the broken curve

– – – *88% of the events were followed by another event in 28 days or less*

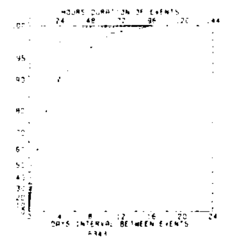
The maximum value(s) of hours duration and/or the days interval will be displayed when the graph limits are exceeded

Durations and intervals for a particular month extend from the time they begin (or the first of the month if already in progress) and are terminated at the actual ending time, regardless of what month that may be

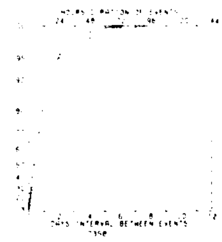
— Number of observations

Top and bottom scales are variable to allow for variations in the data

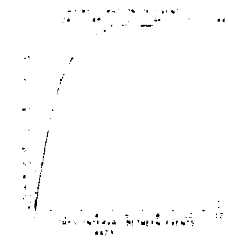
Adak



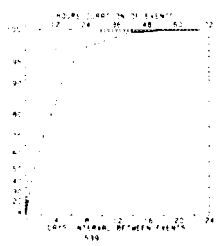
Nome



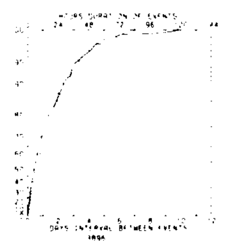
Moses Point



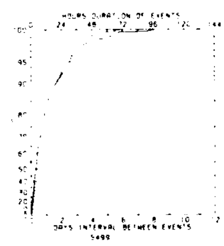
Unalakleet



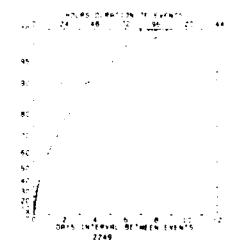
Cape Romanzof



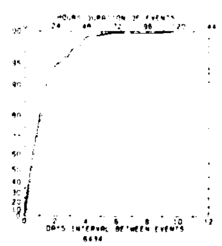
Bethel



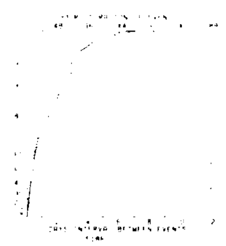
Nikolski



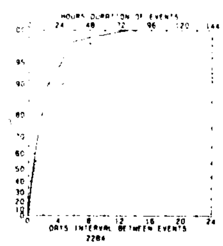
King Salmon



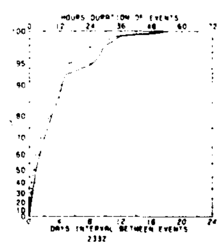
St. Paul



Port Moller

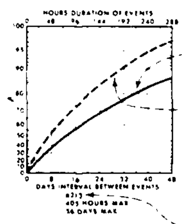


Driftwood Bay



Legend

Persistence of wind ≥20 kts.



Hours duration of events   Days interval between events

Cumulative percent frequency of hours duration equal to or less than the number of hours intersected by the solid curve

(80% of the events had a duration ≤216 hours)

Cumulative percent frequency of days interval between events equal to or less than the number of days intersected by the broken curve

(88% of the events were followed by another event in 28 days or less.)

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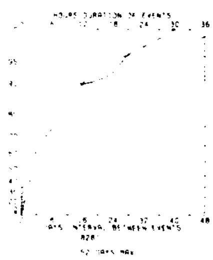
Durations and intervals for a particular month extend from the time they begin (or the first of the month if already in progress) and are *terminated at the actual ending time, regardless of what month that may be*

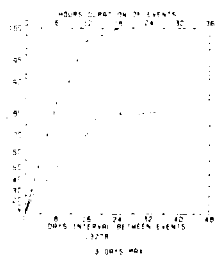
Number of observations

Top and bottom scales are variable to allow for variations in the data

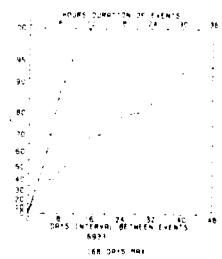
Adak



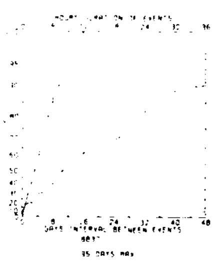
Nome



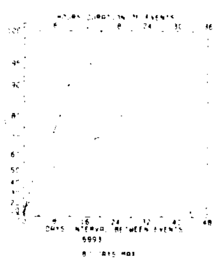
Moses Point



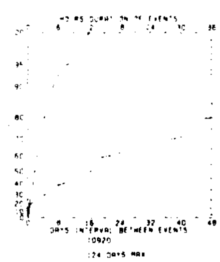
Unalakleet



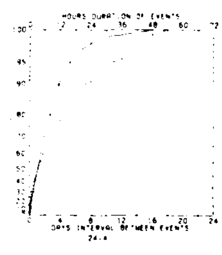
Cape Romanzof



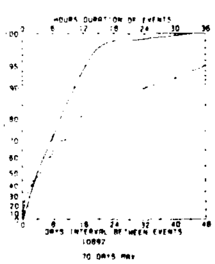
Bethel



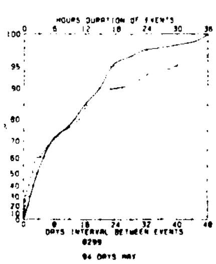
Nikolski



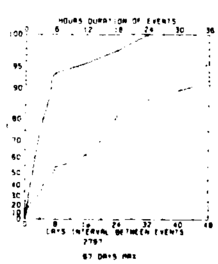
King Salmon



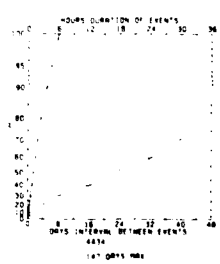
St. Paul



Port Moller



Driftwood Bay

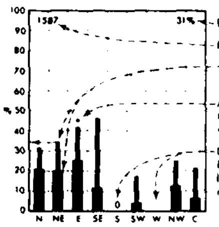


21 Persistence of wind ≥20 kts. **June**

Legend

Precipitation/wind direction

Percent frequency of surface wind observations from each direction and calm that were accompanied by precipitation, subdivided into liquid type (including freezing rain and freezing drizzle) and snow



Percentage of present weather observations reporting precipitation

Number of observations

(34% of all NE winds were accompanied by precipitation, of which 14% was liquid and 20% was snow

An asterisk in the column for a given direction (or calm) indicates that the percentage was based on 10-30 observations of present weather and wind direction

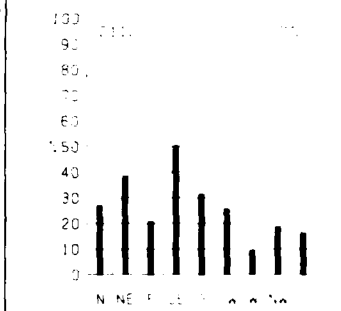
0 replaces bar when no precipitation was observed with winds from a given direction (or calm). No bar graph is presented if less than 10 observations containing present weather were reported for a given direction (or calm)

Map - Precipitation

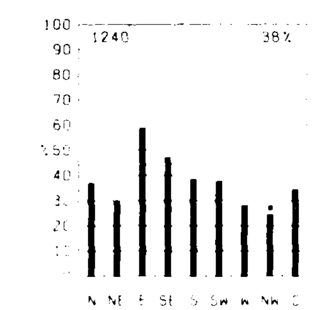
BLACK LINE Percent frequency of observations reporting precipitation

Of all the elements recorded in historical marine observations, precipitation is one of those most subject to interpretation error, from coding practices, observers preference for certain present weather codes, and other biases

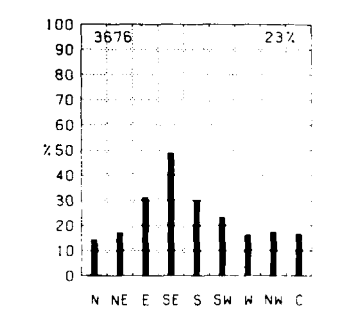
Buhta Provideniya



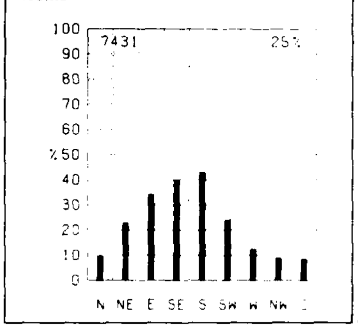
Gambell



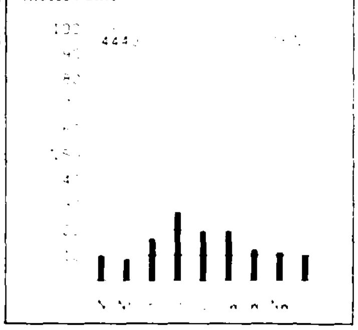
Northeast Cape



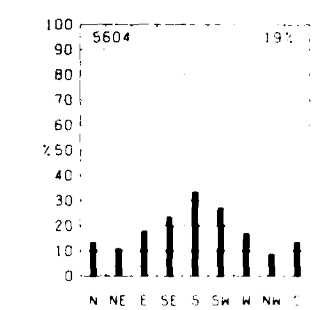
Nome



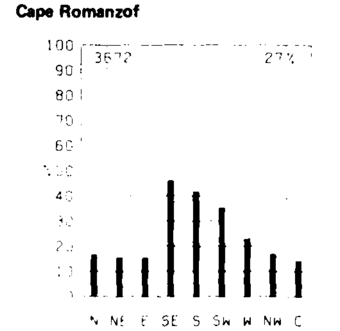
Moses Point



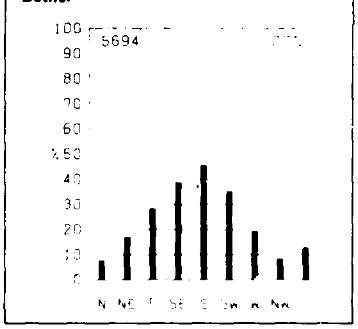
Unalakleet



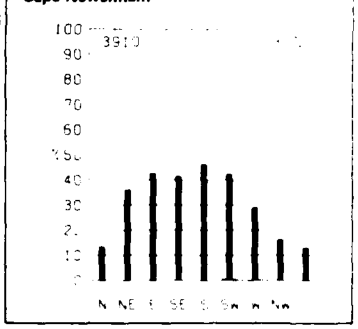
Cape Romanzof



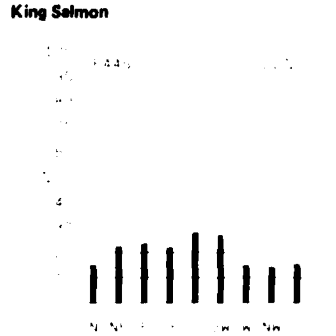
Bethel



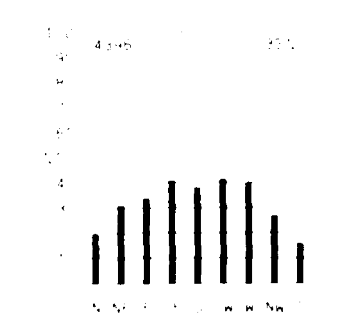
Cape Newenham



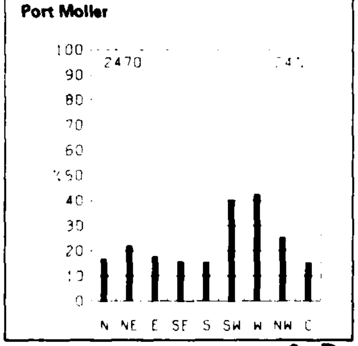
King Salmon



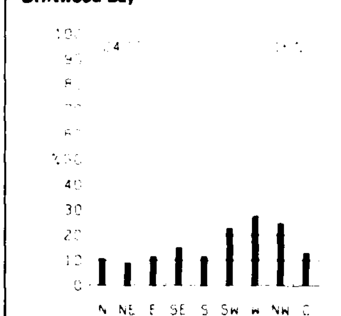
St. Paul

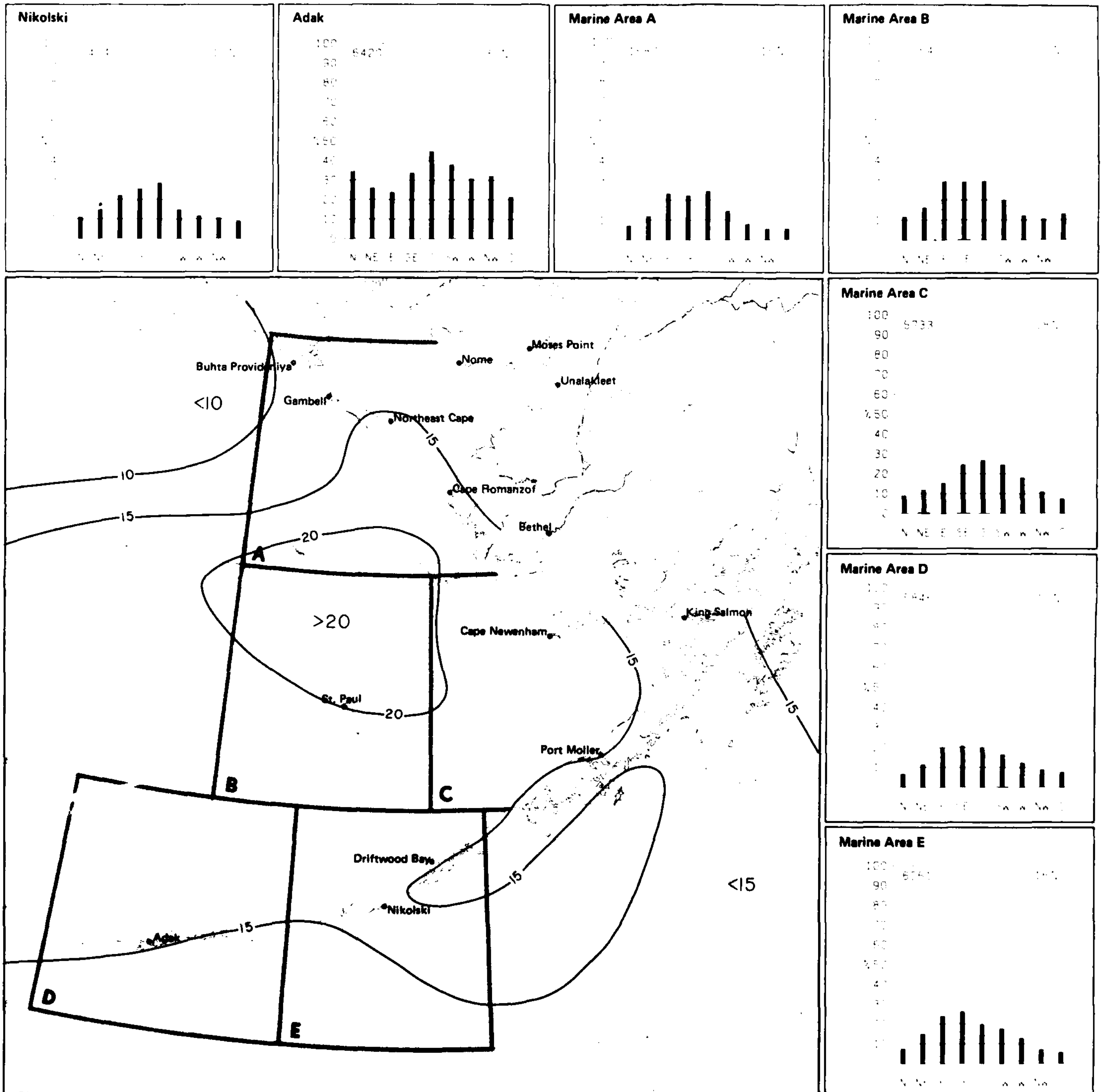


Port Moller



Driftwood Bay

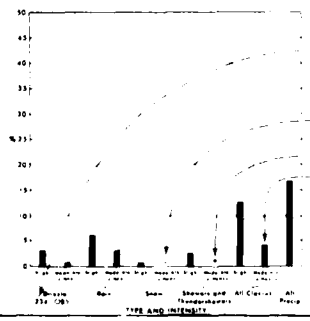




1 Precipitation **July**

Legend

Precipitation types



Percent frequency of precipitation by type and intensity

Number of observations

Bars show percent frequency of observations reporting Precipitation of various types and intensities

0 indicates no observations in the category

• indicates < 05° but >0

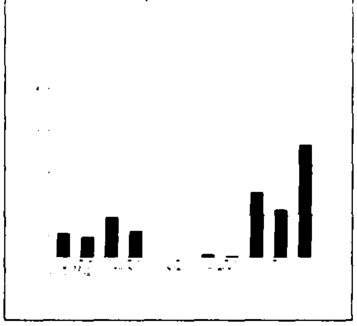
(4 0% of all observations recorded moderate to heavy precipitation)

Map - Snow

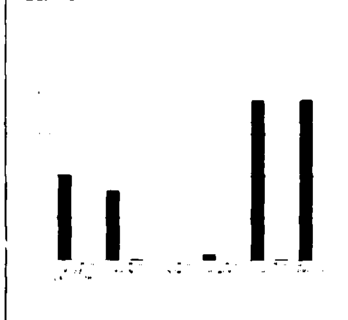
BLACK LINE Percent frequency of precipitation observations reporting snow

The percent frequency of observations reporting snow for a given point can be determined by multiplying the percent frequency of observations reporting precipitation (map 1) with that of precipitation observations reporting snow (map 2).

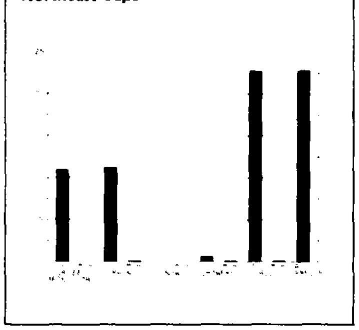
Buhta Provideniya



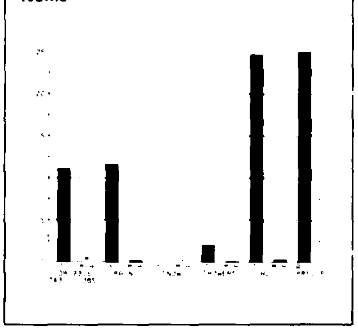
Gambell



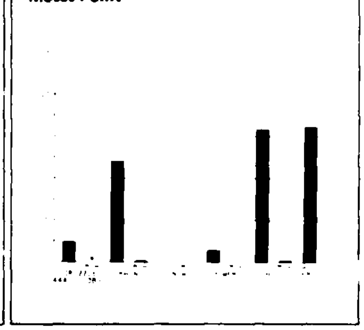
Northeast Cape



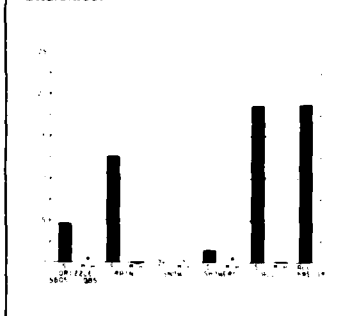
Nome



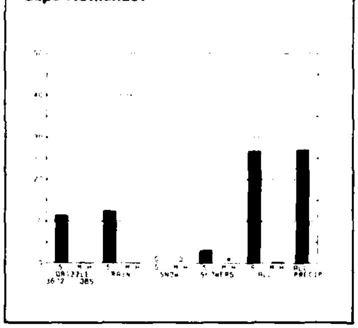
Moses Point



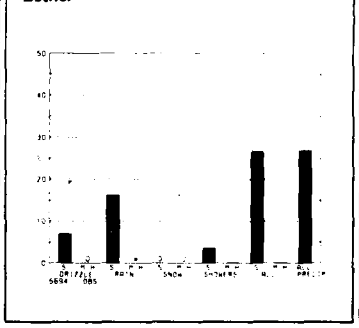
Unalakleet



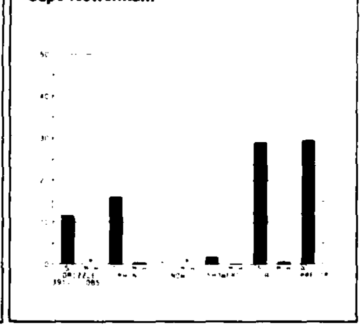
Cape Romanzof



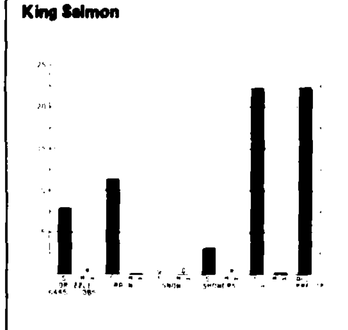
Bethel



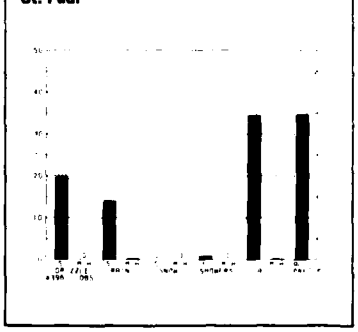
Cape Newenham



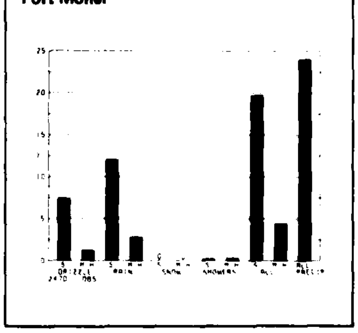
King Salmon



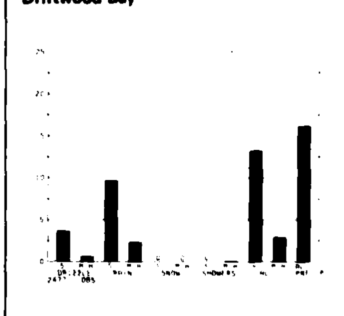
St. Paul

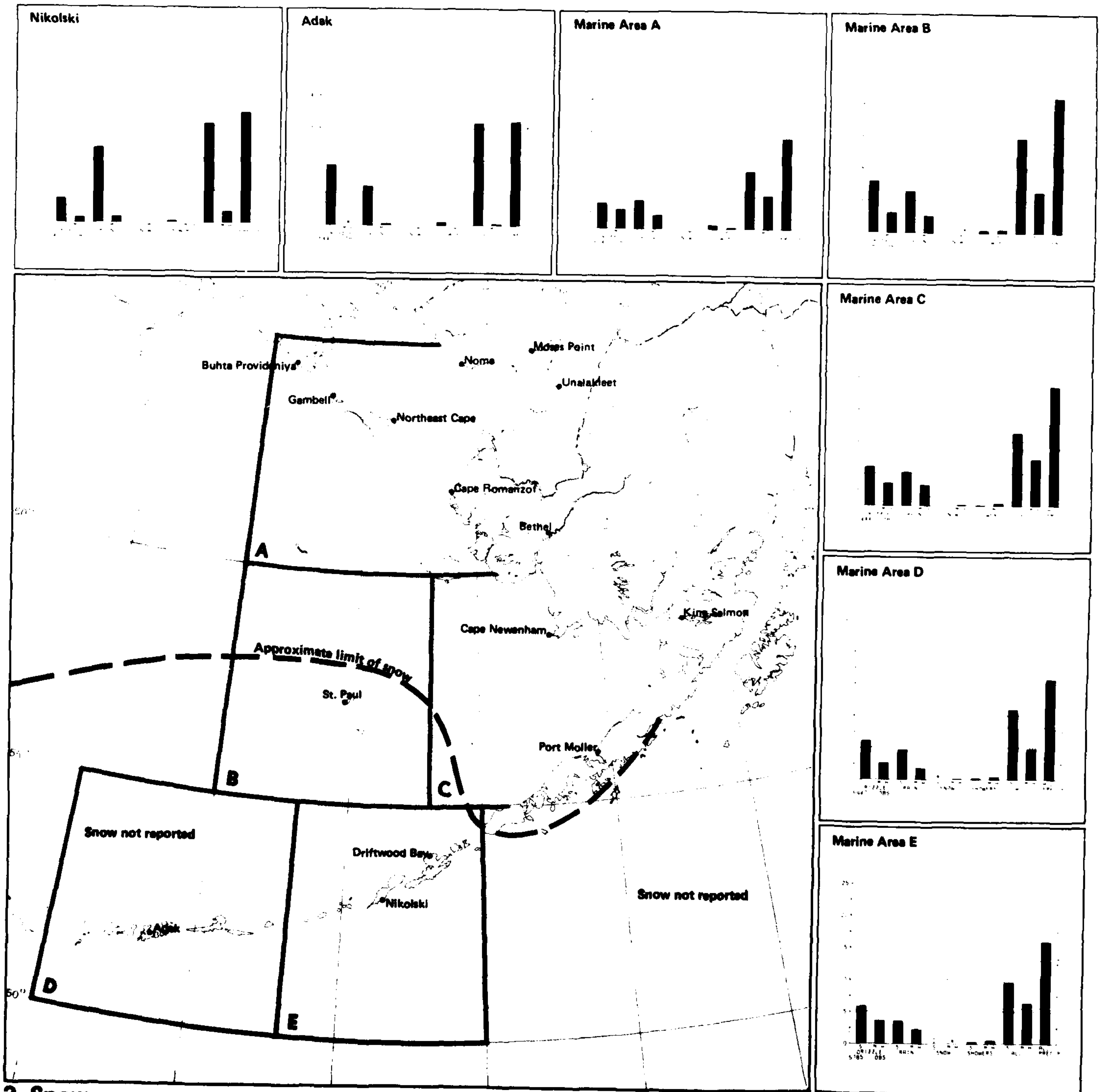


Port Moller



Driftwood Bay



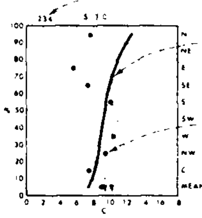

Nikolski
Adak
Marine Area A
Marine Area B
Marine Area C
Marine Area D
Marine Area E
Buhta Providéniya
Nome
Moses Point
Unalakleet
Gambell
Northeast Cape
Cape Romanzof
Bethel
A
King Salmon
Cape Newenham
Approximate limit of snow
St. Paul
Port Moller
B
C
Snow not reported
Driftwood Bay
Nikolski
Snow not reported
Adak
D
E

2 Snow

July

Legend

Air temperature/wind direction



Number of observations

Cumulative percent frequency of temperatures equal to or less than the temperature intersected by the curve

70% of all temperatures were ≤10.3 °C or ≤50.5 °F

S Standard deviation of temperatures °C

Mean temperature for each wind direction, calm and for all data combined are represented by dots

With NW winds, the mean temperature was 9.4 °C or 48.9 °F

Indicates that the mean temperature for a direction or calm was computed from 10-30 observations

The mean temperature is omitted when less than 10 observations for a direction or calm were available

Map · Air temperature mean and thresholds

BLACK LINE Percent frequency of temperature ≤0°C ≤32°F

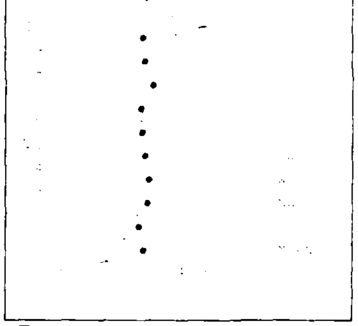
RED LINE Mean air temperature °C

BLUE LINE Percent frequency of wind chill temperature ≤ 30°C ≤ 22°F

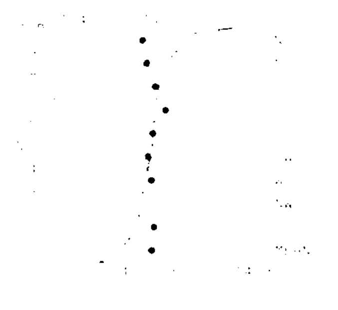
Air temperature readings recorded on transient ships in warm, sunny weather appear biased toward high temperatures, apparently because of improper instrument exposure and ventilation. Despite the inaccuracies, the large-scale patterns and mean gradients of the isopleth analyses are relatively accurate.

The temperature scale of the graph may vary in both range and class interval. The percentage of temperature observations greater than a given value can be obtained by subtracting the cumulative percent frequency of that value from 100%. The number of observations and the standard deviation plus the plotted points on the graphs are based on those observations reporting both temperature and wind direction. The cumulative curve is based on all observations reporting temperature with or without wind direction.

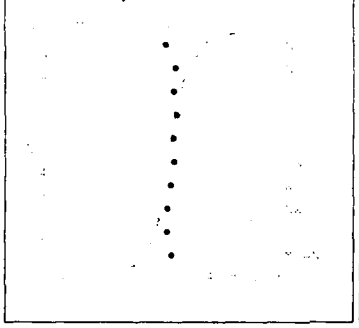
Buhta Provideniya



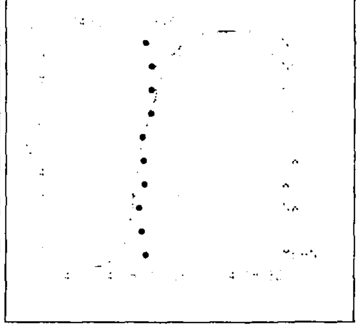
Gambell



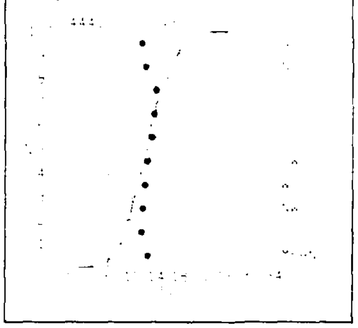
Northeast Cape



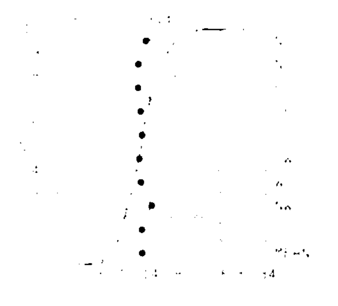
Nome



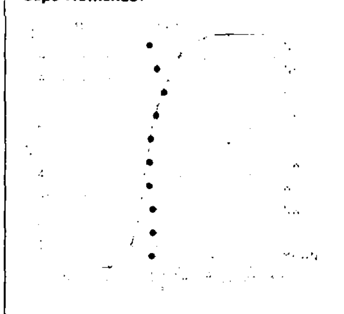
Moses Point



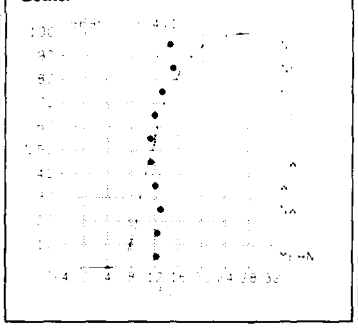
Unalakleet



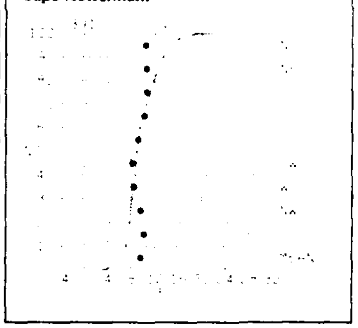
Cape Romanzof



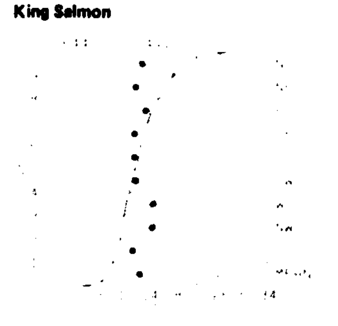
Bethel



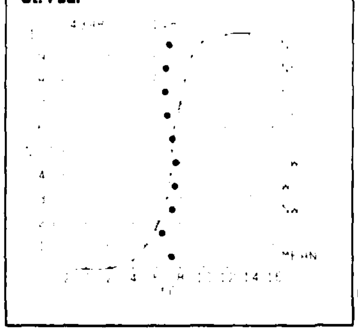
Cape Newenham



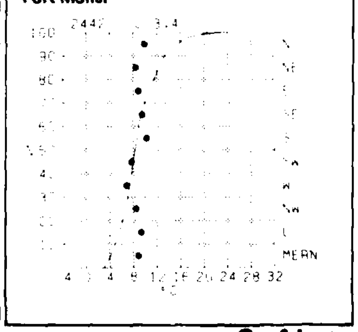
King Salmon



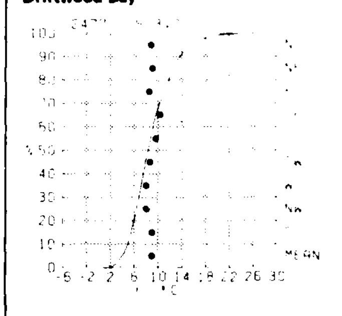
St. Paul

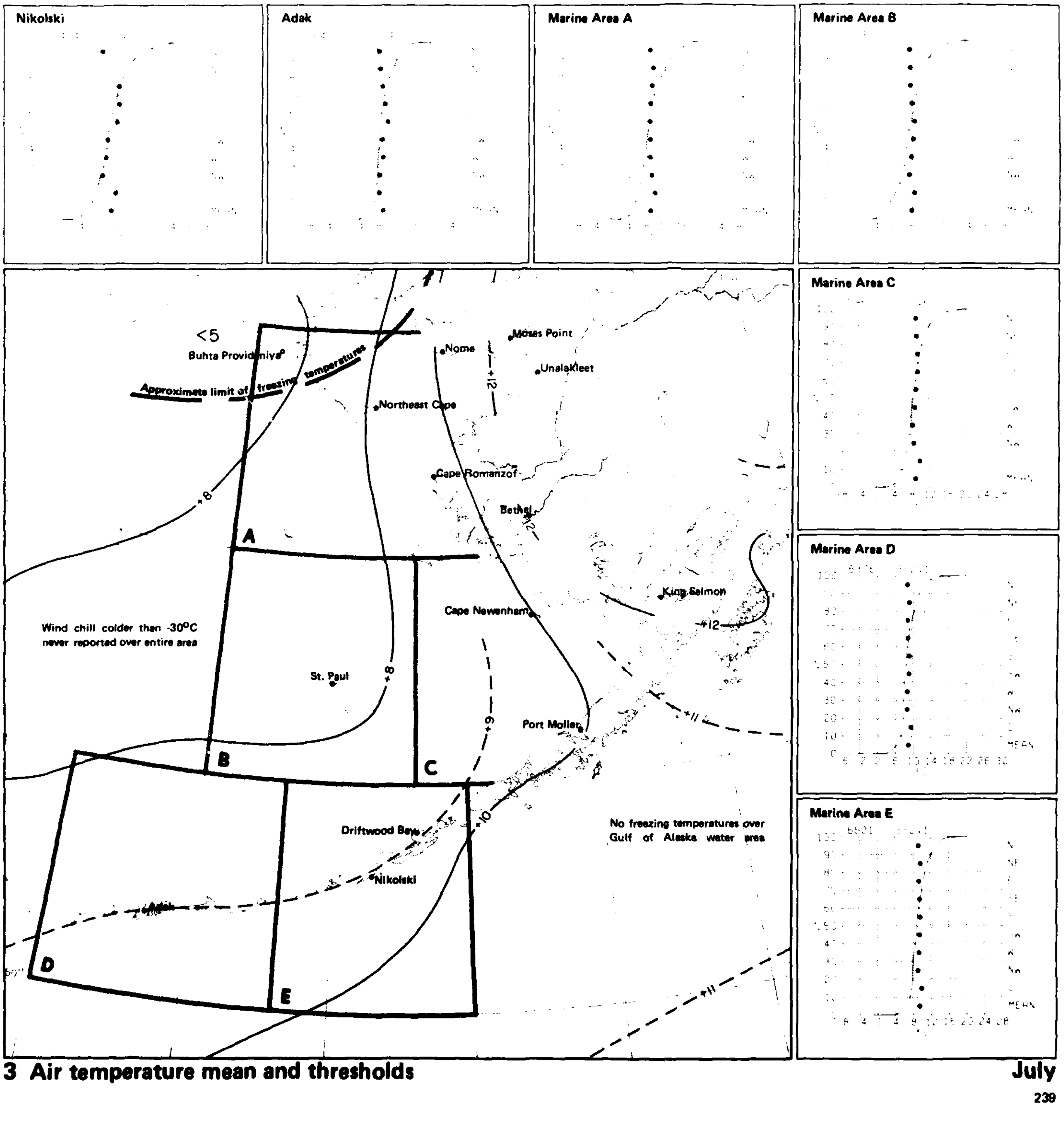


Port Moller



Driftwood Bay

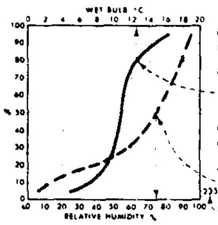




3 Air temperature mean and thresholds **July**

Legend

Wet bulb/relative humidity



Cumulative percent frequency of wet bulb temperatures equal to or less than the temperature intersected by the curve (top scale)

Wet bulb (°C)

(80% of all observed wet bulb temperatures were ≤12.5°C or 54.5°F)

Cumulative percent frequency of relative humidities equal to or less than the humidity intersected by the curve (bottom scale)

Relative humidity (%)

(50% of all observed relative humidities were ≤74%)

Number of observations

Map - Mean dew point temperature

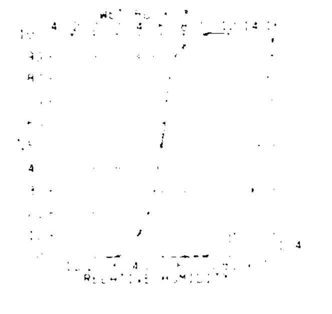
BLACK LINE Mean dew point temperature (°C)

The observation count of the graph reflects those observations reporting both air and wet bulb temperatures; both are required in computing the relative humidity. The percentage of observations of either element greater than a given value can be obtained by subtracting the cumulative percent frequency of that value from 100%.

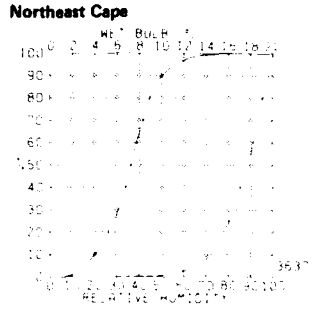
Buhta Provideniya

Insufficient Data

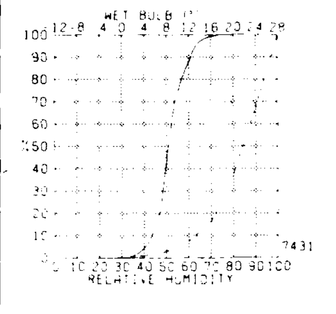
Gambell



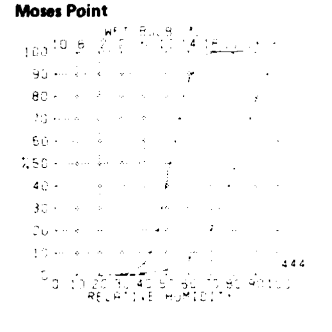
Northeast Cape



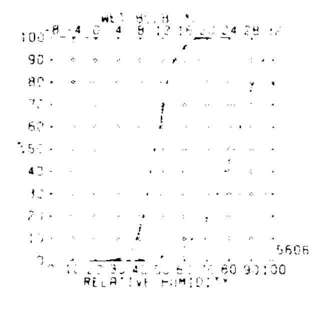
Nome



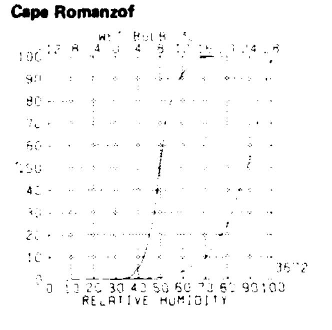
Moses Point



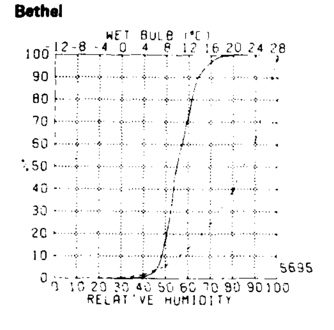
Unalakleet



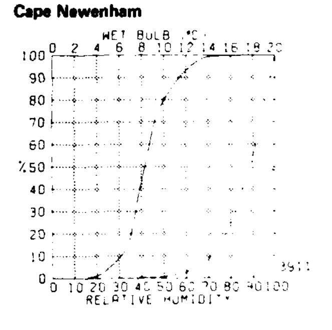
Cape Romanzof



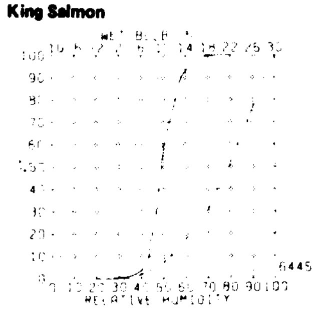
Bethel



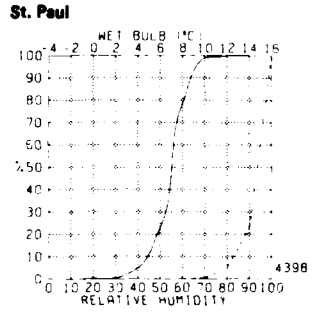
Cape Newenham



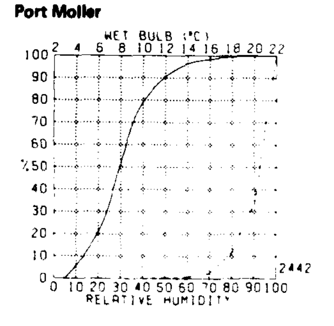
King Salmon



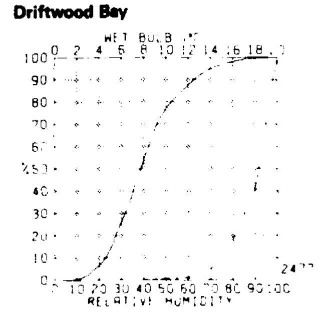
St. Paul

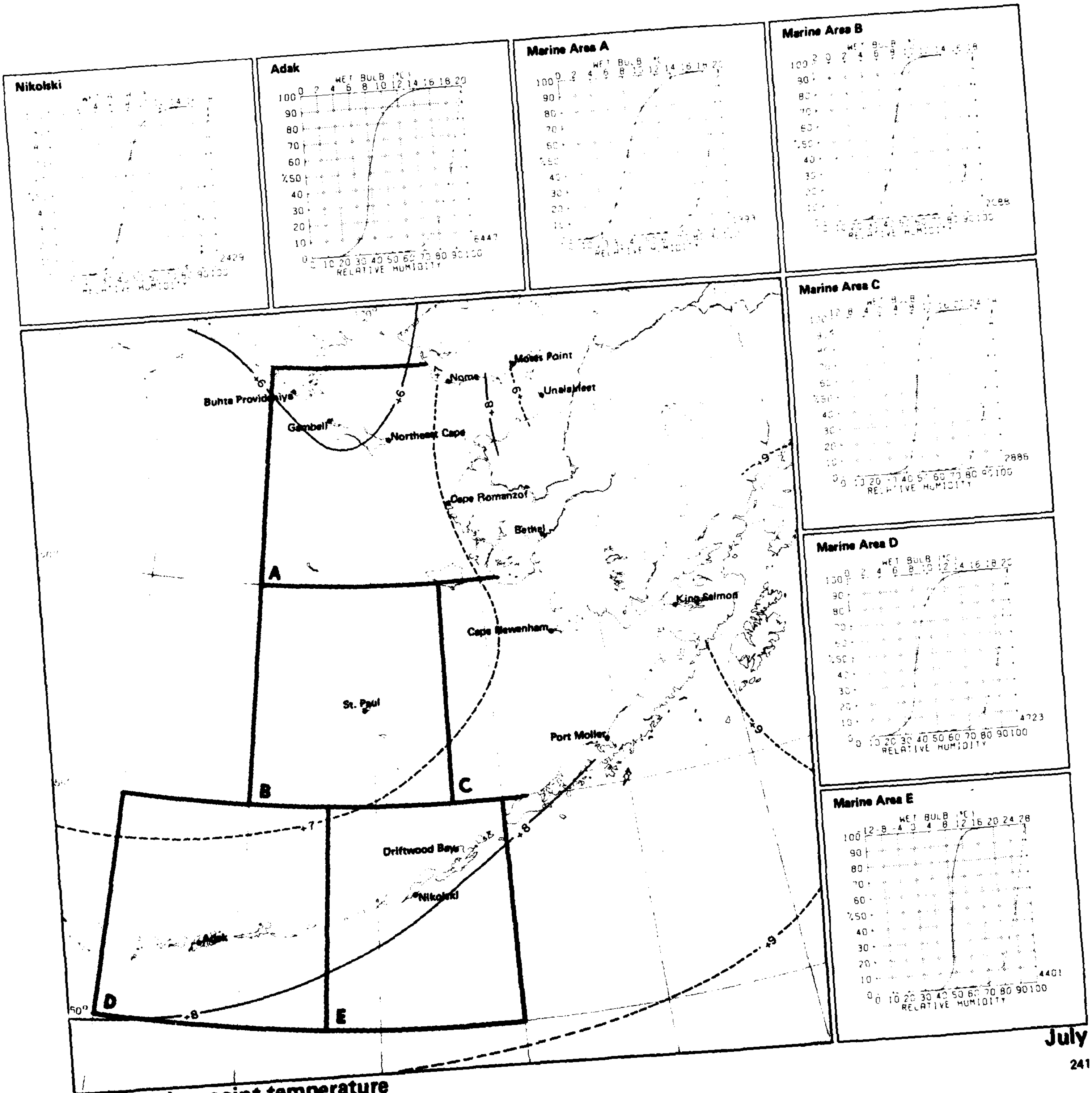


Port Moller



Driftwood Bay





4 Mean dew point temperature

July

Legend

Air temperature/wind speed

WIND SPEED (kts)

Percent frequency of simultaneous occurrence of specified temperature (°C) and wind speed (knots)

1% of all observations reported temperature 2.3°C simultaneously with wind speed of 22-33 kts

+ Indicates < 5% but >0

Number of observations

3550

Map · Air temperature extremes (°C)

BLACK LINE Maximum 99% air temperature (1% of temperatures were greater than the given value)

BLUE LINE Minimum 1% air temperature (1% of temperatures were equal to or less than the given value)

The graph can be used to determine the extent of human discomfort from the combined effects of extreme heat or cold and winds or to estimate the likelihood of superstructure icing. Icing potential increases as the air temperature drops below freezing and the winds increase above 10 knots (12 mph) and may become quite severe with temperatures equal to or less than -9°C (16°F) and winds equal to or greater than 34 knots (39 mph).

Buhta Provideniya

Gambell

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
[illegible]	+	+	+	[illegible]	[illegible]
[illegible]	+	[illegible]	[illegible]	+	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	4	[illegible]	4	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+
[illegible]	+	[illegible]	[illegible]	+	[illegible]
[illegible]	[illegible]	[illegible]	+	[illegible]	[illegible]
[illegible]	0	0	0	[illegible]	0
[illegible]	0	0	0	0	0
[illegible]	0	0	0	0	0
[illegible]	0	0	0	0	0

1240

Northeast Cape

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
[illegible]	+	+	+	+	[illegible]
[illegible]	+	[illegible]	[illegible]	+	[illegible]
[illegible]	+	[illegible]	[illegible]	+	[illegible]
[illegible]	[illegible]	4	4	+	+
[illegible]	[illegible]	[illegible]	[illegible]	+	+
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+
[illegible]	5	13	10	1	+
[illegible]	[illegible]	4	3	+	0
[illegible]	1	2	1	0	0
[illegible]	+	+	+	0	0
-2.-1	0	0	0	0	0

3657

Nome

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
[illegible]	+	+	+	+	[illegible]
[illegible]	+	+	+	+	[illegible]
[illegible]	+	+	+	+	[illegible]
[illegible]	+	+	+	+	[illegible]
[illegible]	+	+	+	+	[illegible]
[illegible]	+	[illegible]	[illegible]	+	[illegible]
[illegible]	[illegible]	3	[illegible]	+	[illegible]
[illegible]	[illegible]	4	[illegible]	+	[illegible]
[illegible]	[illegible]	[illegible]	4	+	+
[illegible]	2	[illegible]	5	+	0
[illegible]	6	27	15	1	0

7431

Moses Point

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
[illegible]	+	+	+	[illegible]	[illegible]
[illegible]	+	+	+	[illegible]	[illegible]
[illegible]	+	+	+	[illegible]	[illegible]
[illegible]	+	+	+	[illegible]	[illegible]
[illegible]	+	+	+	[illegible]	[illegible]
[illegible]	[illegible]	4	[illegible]	+	[illegible]
[illegible]	[illegible]	[illegible]	4	+	[illegible]
[illegible]	[illegible]	[illegible]	4	+	+
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+
[illegible]	[illegible]	[illegible]	6	[illegible]	+
[illegible]	3	8	[illegible]	[illegible]	[illegible]

4441

Unalakleet

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
30.31	0	+	[illegible]	0	0
28.29	0	0	+	0	0
26.27	+	+	0	0	0
24.25	+	+	+	0	0
22.23	+	+	+	0	0
20.21	+	1	1	+	0
18.19	1	3	2	+	0
16.17	2	8	3	+	0
14.15	2	9	4	+	0
12.13	4	15	8	+	+
≤11	4	20	11	1	0

5605

Cape Romanzof

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
26.27	+	+	0	0	0
24.25	+	+	0	0	0
22.23	+	+	+	0	0
20.21	+	+	+	0	0
18.19	+	1	+	0	0
16.17	1	2	1	0	0
14.15	1	2	1	+	0
12.13	3	6	3	+	0
10.11	4	8	5	+	0
8.9	6	14	9	+	0
≤7	6	16	10	1	0

3672

Bethel

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
28.29	0	+	+	0	0
26.27	+	+	+	0	0
24.25	+	1	+	0	0
22.23	+	1	+	0	0
20.21	+	2	1	0	0
18.19	+	4	1	+	0
16.17	1	6	2	+	0
14.15	1	7	3	+	0
12.13	2	13	6	+	0
10.11	1	13	7	+	0
≤9	2	15	10	1	0

5695

Cape Newenham

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
24.25	0	+	0	0	0
22.23	+	0	0	0	0
20.21	+	+	0	0	0
18.19	+	+	+	0	0
16.17	1	1	+	0	0
14.15	2	2	1	0	0
12.13	5	6	4	+	0
10.11	6	9	6	+	0
8.9	8	16	11	+	0
6.7	4	8	6	+	0
≤5	1	1	1	0	0

3910

King Salmon

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
28.29	+	+	0	0	0
26.27	+	+	+	0	0
24.25	+	1	+	+	0
22.23	+	1	1	+	0
20.21	+	2	1	+	0
18.19	1	4	1	+	0
16.17	1	6	3	+	0
14.15	1	6	3	+	0
12.13	3	13	6	1	0
10.11	3	12	5	+	+
≤9	5	16	5	+	+

6445

St. Paul

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
16.17	0	+	0	0	0
14.15	0	+	+	0	0
12.13	+	1	+	0	0
10.11	+	3	4	+	0
8.9	1	16	18	1	0
6.7	2	22	21	1	0
4.5	1	5	3	+	0
2.3	+	1	1	0	0
0.1	+	+	0	0	0
-2.-1	+	+	0	0	0
-4.-3	0	0	0	0	0

4398

Port Moller

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
22.23	+	+	0	0	0
20.21	+	+	+	0	0
18.19	+	1	+	0	0
16.17	1	2	+	0	0
14.15	1	2	+	+	0
12.13	3	6	3	+	0
10.11	4	7	4	+	0
8.9	5	12	6	1	0
6.7	5	16	5	+	0
4.5	2	6	2	+	0
2.3	+	2	+	0	0

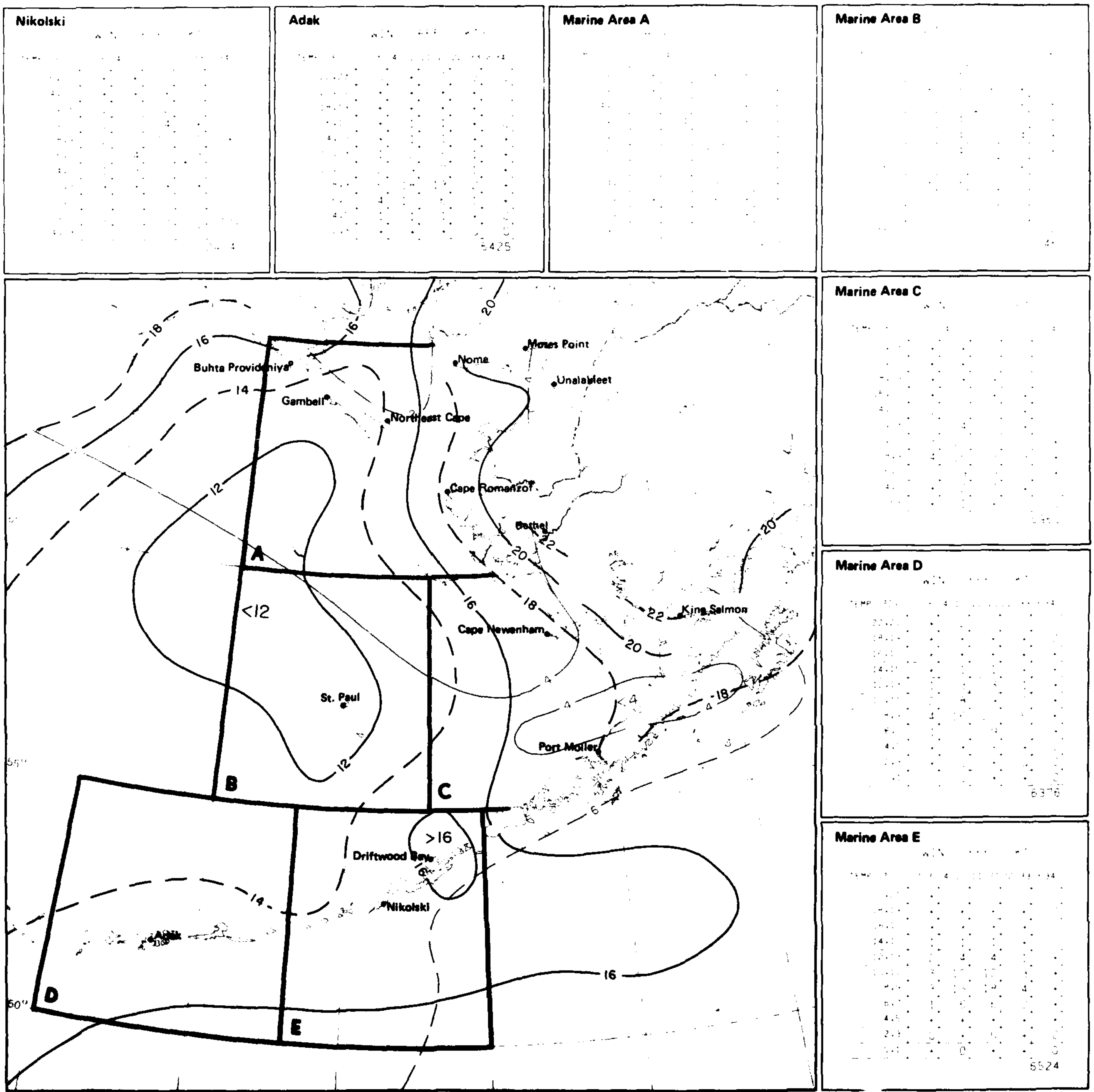
2442

Driftwood Bay

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
24.25	0	+	0	0	0
22.23	0	+	+	0	0
20.21	+	+	+	+	0
18.19	1	1	+	+	0
16.17	1	1	1	+	0
14.15	1	2	1	+	0
12.13	5	5	2	+	0
10.11	6	6	3	+	0
8.9	8	9	4	+	0
6.7	10	12	4	+	0
≤5	4	7	2	+	0

2477

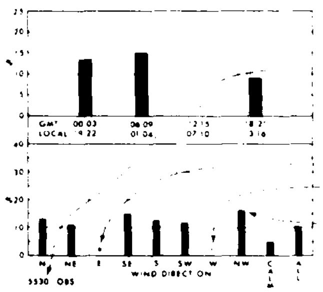


5 Air temperature extremes (^{o}C)

July

Legend

Fog/time and fog/wind direction



Number of observations

Bar graphs represent percent frequency of Fog (without precipitation) for various hour groupings and wind directions. Data are based on 100% for each hour group and direction category.

• indicates <.05% but >0

0 indicates no fog occurred with the wind direction

Data show that 17% of all NW winds were accompanied by Fog (without precipitation).

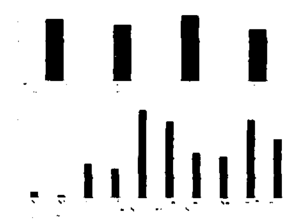
Map - Fog

BLACK LINE Percent frequency of occurrence of all fog

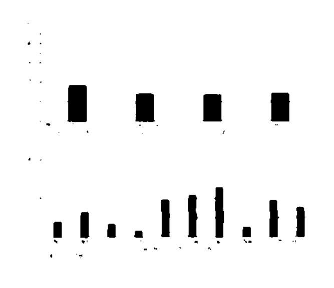
BLUE LINE Percent frequency of fog occurring without precipitation

The percent frequency of observations reporting fog with precipitation for a given point can be determined by computing the difference between the two analyses.

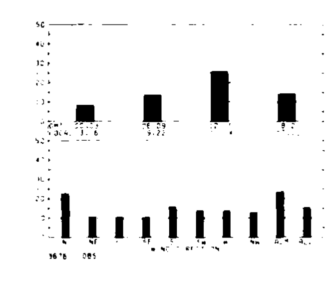
Buhta Provideniya



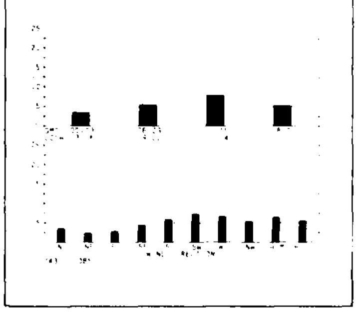
Gambell



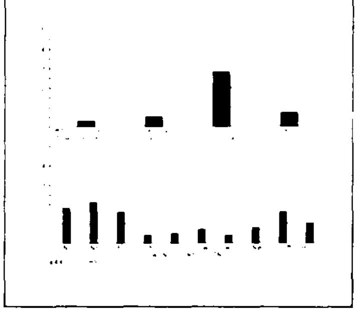
Northeast Cape



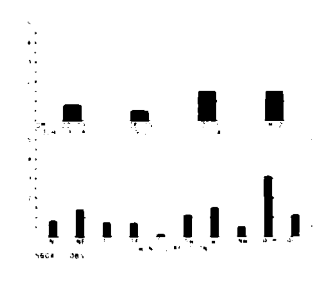
Nome



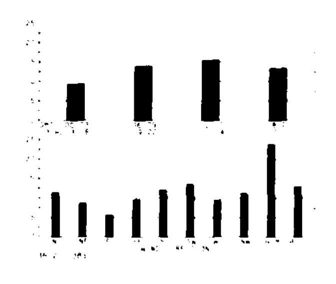
Moses Point



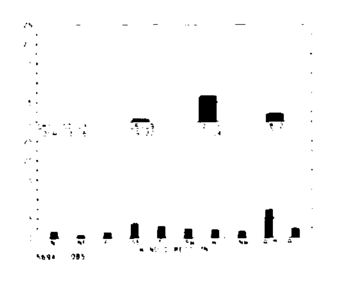
Unalakleet



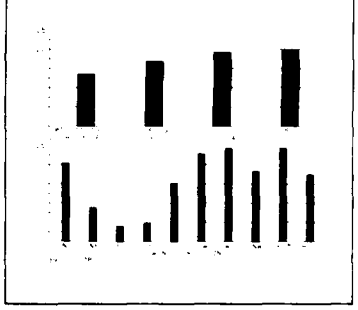
Cape Romanzof



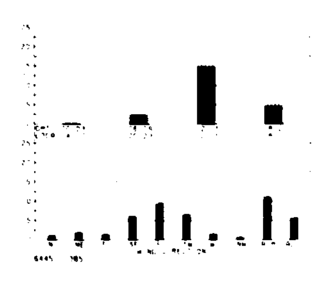
Bethel



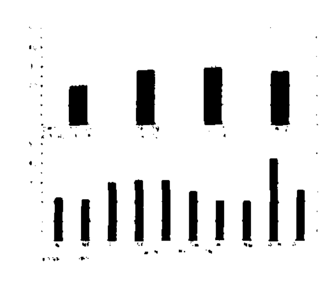
Cape Newenham



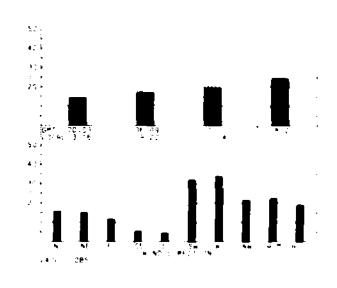
King Salmon



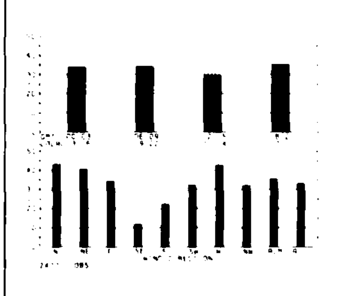
St. Paul



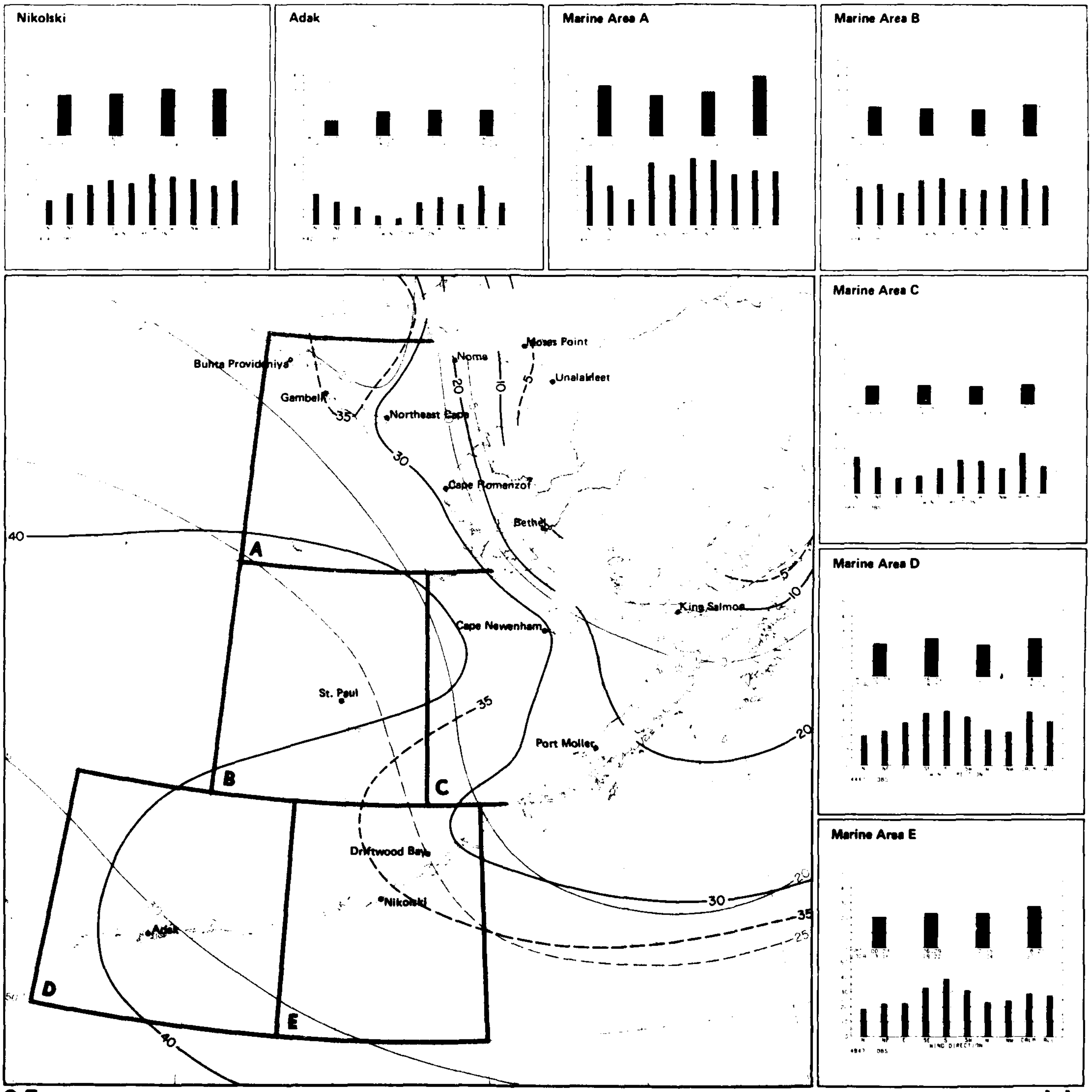
Port Moller



Driftwood Bay



July **6 Fog/time and fog/wind direction**

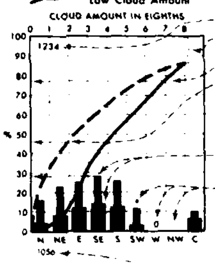

Nikolski
Adak
Marine Area A
Marine Area B
Marine Area C
Marine Area D
Marine Area E
Buhta Providéniya
Gambell
Northeast Cape
Nome
Moses Point
Unalakleet
Cape Romanzof
Bethel
King Salmon
Cape Newenham
St. Paul
Port Moller
Driftwood Bay
Nikolski
Adak
A
B
C
D
E
40
35
30
20
10
5
25

6 Fog

July

Legend

Cloud cover/wind direction



Total Cloud Amount
Low Cloud Amount

Cumulative percent frequency of indicated cloud amount equal to or less than the amount intersected by the curve

Number of total cloud observations

Obscurations

(77% of all total cloud amounts were ≤7/8)

(46% of all low cloud amounts were ≤2/8)

Low cloud amount. Percent frequency of observations from each direction and calm that were accompanied by low cloud amounts ≥5/8 and ≥7/8. Low clouds are clouds with bases <8000 feet

(28% of all SE winds were accompanied by low cloud amounts ≥5/8 and 14% by low cloud amounts ≥7/8.)

An asterisk indicates that the percentage is based on 10-30 observations of wind direction, total and low cloud amount. 0 replaces bar graph when no low cloud amounts ≥5/8 were observed with a wind direction or calm. 0 or bar is omitted when number of observations of total and low cloud amount from a wind direction or calm is less than 10

Number of low cloud observations

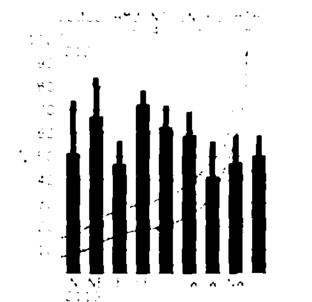
Map · Cloud amount thresholds

BLACK LINE Percent frequency of total cloud amount ≤2/8

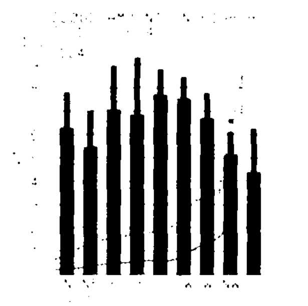
BLUE LINE Percent frequency of low cloud amount ≥5/8

Since the number of observations reporting low cloud amount is usually less than that for total cloud amount, somewhat different samples may be used to compute the two curves on the graph. This may lead to inconsistencies where low cloud amount appears higher than the total cloud amount. Where this occurred the graph was adjusted in favor of the total cloud by making the curves coincide. The frequency of obscured conditions may be determined by subtracting the cumulative percent frequency corresponding to 8/8 coverage from 100%. In computing the bar graph, obscurations are considered as 8/8 coverage.

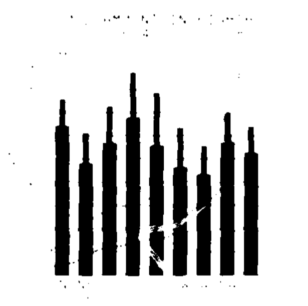
Buhta Provideniya



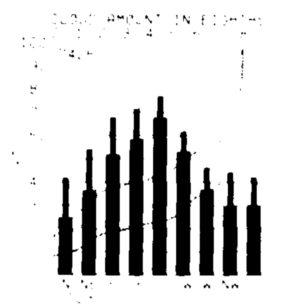
Gambell



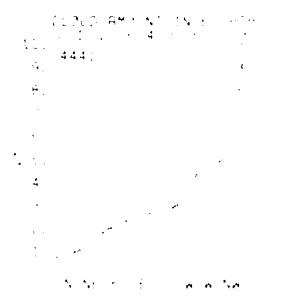
Northeast Cape



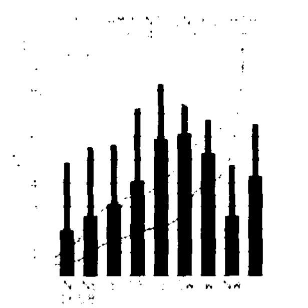
Nome



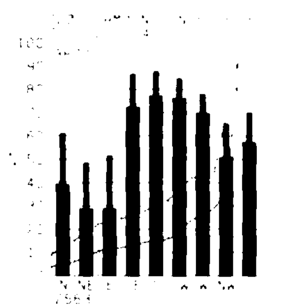
Moses Point



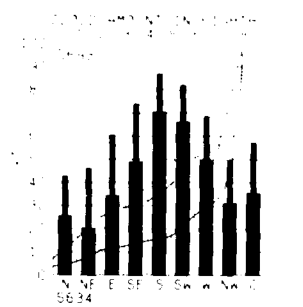
Unalakleet



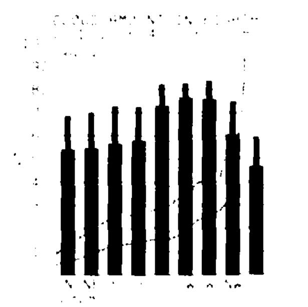
Cape Romanzof



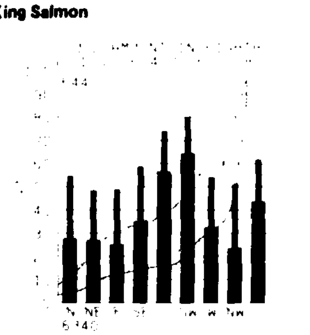
Bethel



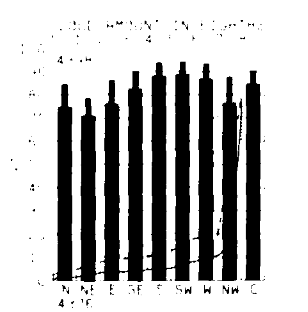
Cape Newenham



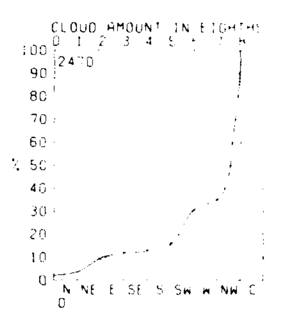
King Salmon



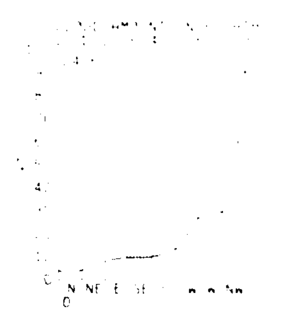
St. Paul

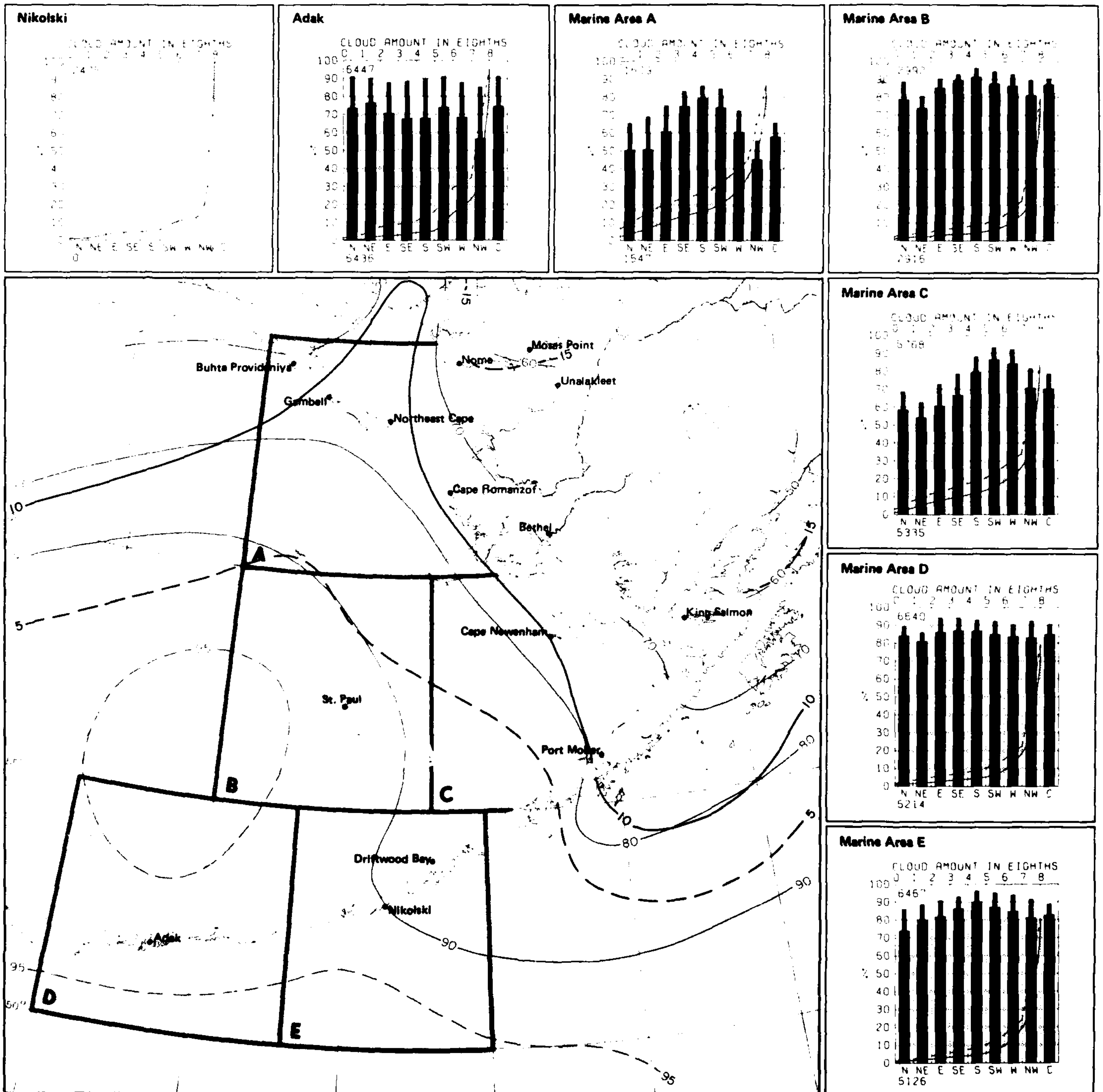


Port Moller



Driftwood Bay

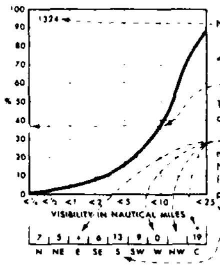




7 Cloud amount thresholds **July**

Legend

Visibility/wind direction



- Number of observations
- Cumulative percent frequency of visibilities less than the visibility intersected by the curve
- (37% of all visibilities reported were <10 nautical miles

The table below the graph indicates percent frequency of occurrence of visibility <2 nautical miles versus wind direction

- indicates < 5% but > 0. 0 indicates that no visibilities <2 nautical miles were observed with winds from a direction or calm. No percentage is given if less than 10 observations were available for visibility and wind direction. An asterisk indicates that the percentage was based on 10-30 observations of visibility and wind direction.

(13% of all S winds were accompanied by visibilities <2 nautical miles)

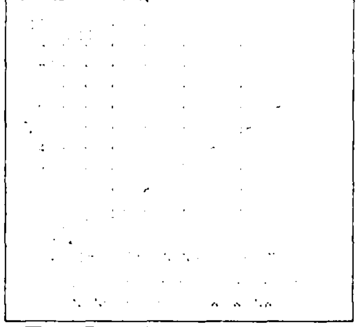
Map - Visibility thresholds

BLACK LINE Percent frequency of visibilities ≥5 nautical miles

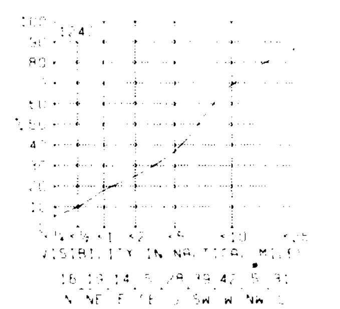
BLUE LINE Percent frequency of visibilities <2 nautical miles

The percentage of visibility equal to or greater than a given value can be obtained from the graph by subtracting the cumulative percent frequency of that value from 100. Visibility at sea is difficult to measure because of the lack of reference points. Also, some observers seem to report reduced visibilities at night because of darkness, though this tendency has abated in recent years. The coarseness of the coding intervals, however, tends to minimize serious biases in the summarized data. Visibilities greater than 25 nmi should be interpreted cautiously because the earth's curvature makes it impossible to see 25 nmi horizontally from the bridges of most ships.

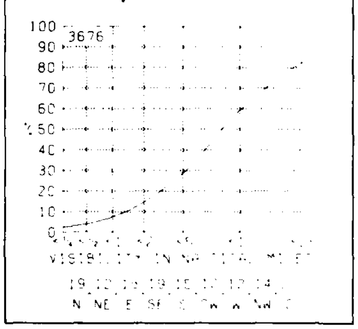
Buhta Providenіya



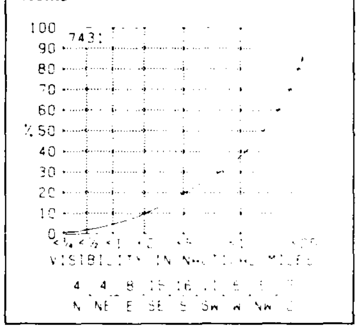
Gambell



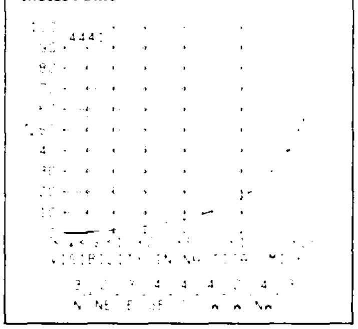
Northeast Cape



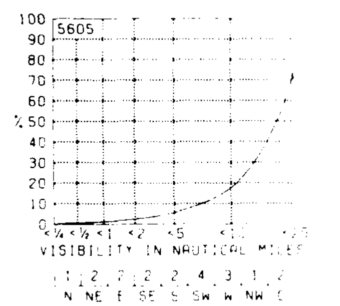
Nome



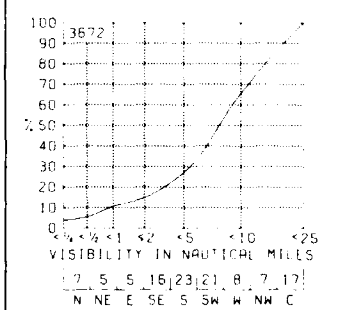
Moses Point



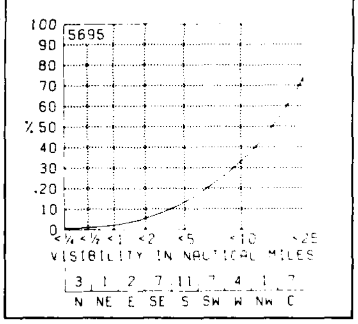
Unalakleet



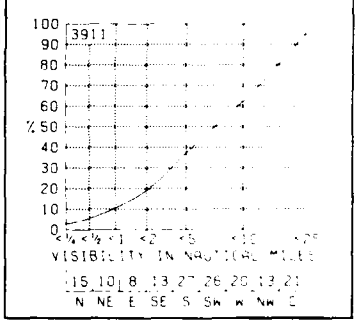
Cape Romanzof



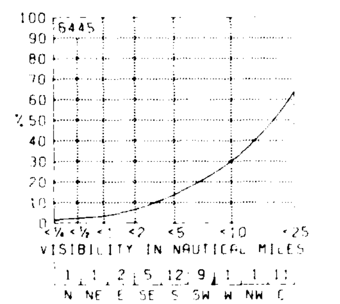
Bethel



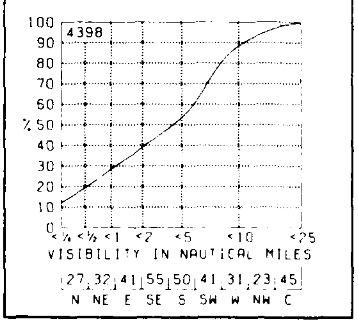
Cape Newenham



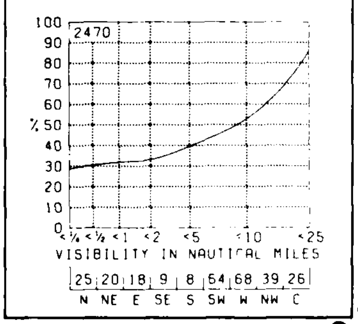
King Salmon



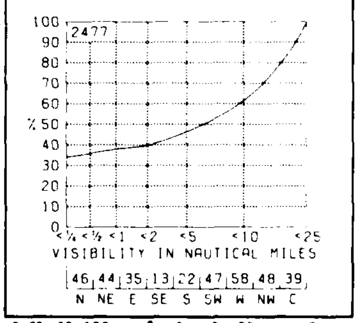
St. Paul

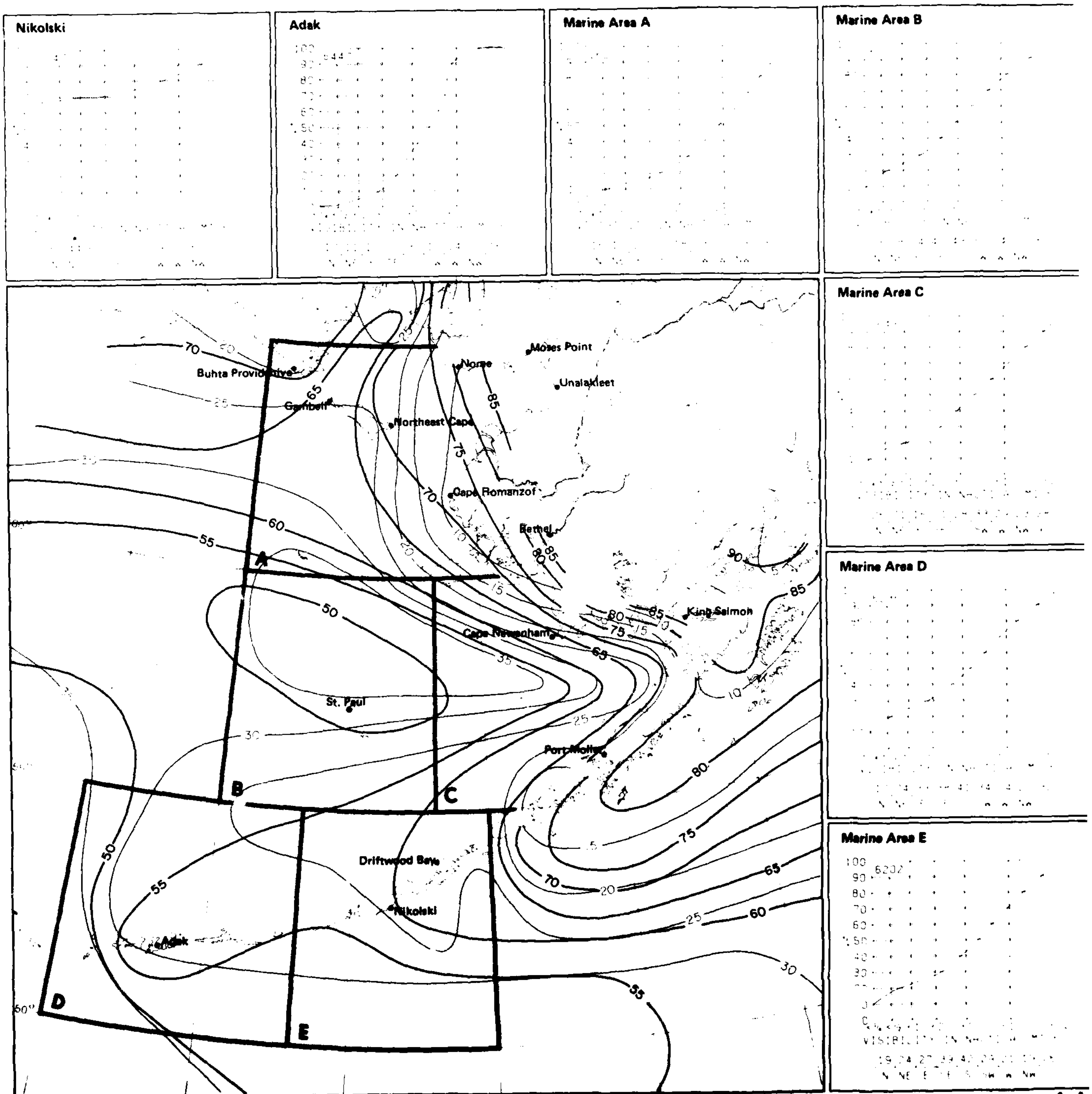


Port Moller



Driftwood Bay





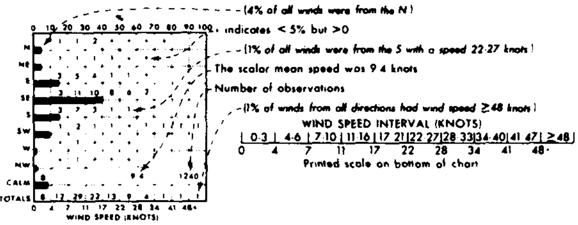
8 Visibility thresholds

July

Legend

Wind speed/direction

Direction frequency (top scale): Bars represent percent frequency of winds observed from each direction. Speed frequency (bottom scale): Printed figures represent percent frequency of wind speeds observed from each direction.



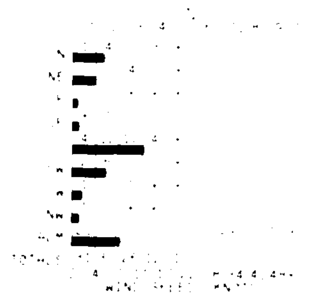
Map - Wind speed thresholds

BLACK LINE Percent frequency of wind speed ≤10 knots (≤12 mph)

BLUE LINE Percent frequency of wind speed ≥34 knots (≥39 mph)

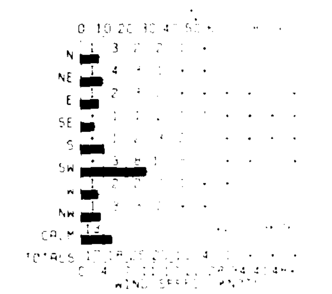
The scalar mean wind speed on the graph is based on the number of observations reporting a wind speed with direction. The sum of the totals line provides the cumulative percent frequency of wind speed below a selected threshold value. In the example graph, 71% of all winds were less than 17 knots (20 mph).

Buhta Providenlya

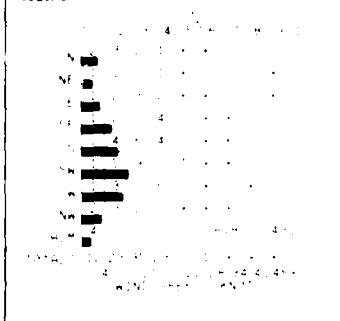


Gambell

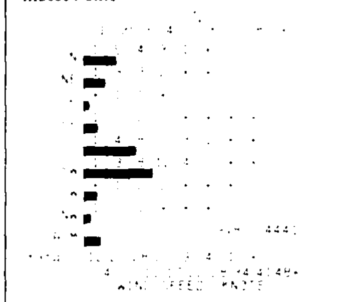
Northeast Cape



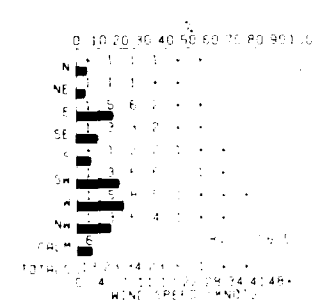
Nome



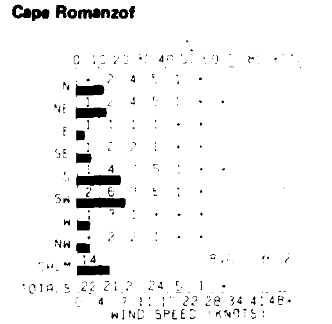
Moses Point



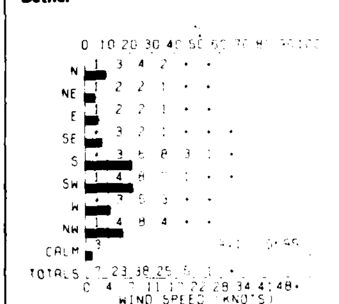
Unalakleet



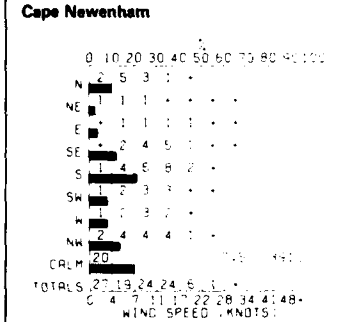
Cape Romanzof



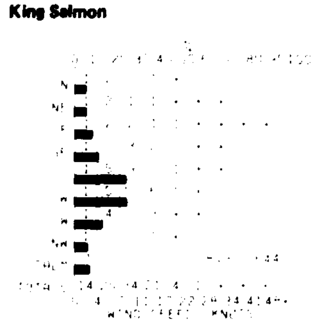
Bethel



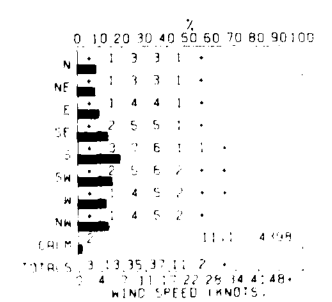
Cape Newenham



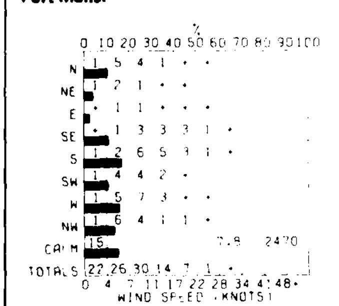
King Salmon



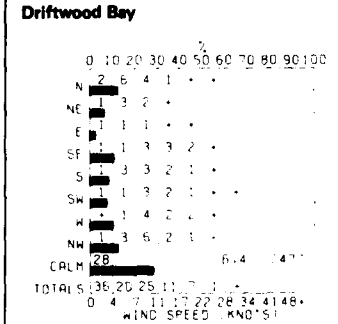
St. Paul

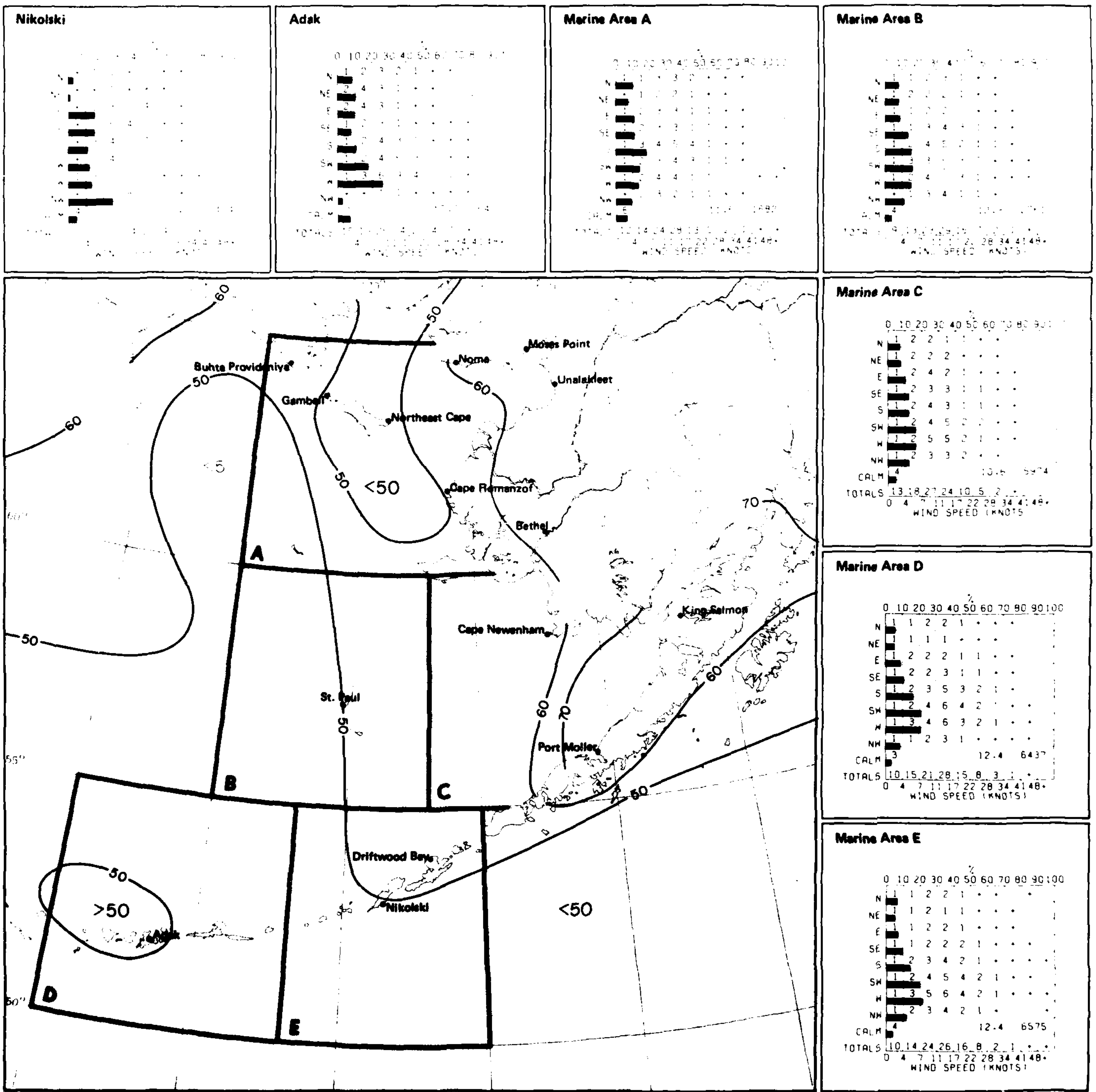


Port Moller



Driftwood Bay

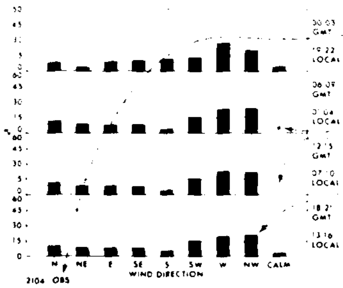




9 Wind speed thresholds

July

Legend **Wind direction/diurnal variation**



Number of observations

Bars show percent frequency of wind direction (8 pts) by hour (GMT and Local Time). Data are based on 100% for each hour group

* indicates < 05% but >0

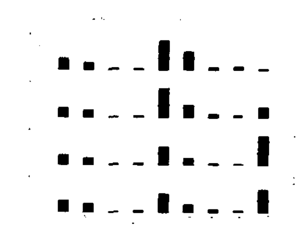
0 indicates no observations in the category

(22% of the wind observations for the hours 18 and 21 GMT (13 and 16 Local Time) had a direction from the northwest)

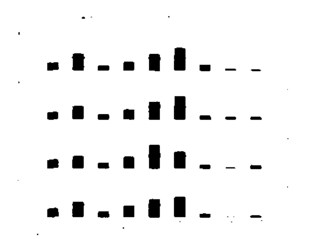
Map · Vector mean wind

10.2 Direction of flow toward station dot, vector magnitude in knots (example: vector mean wind is from northeast at 10.2 knots or 11.7 mph)

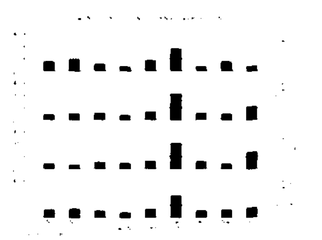
Buhta Provideniya



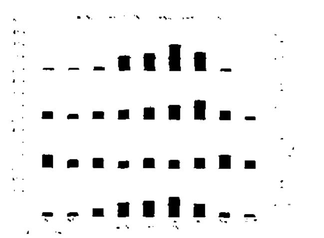
Gambell



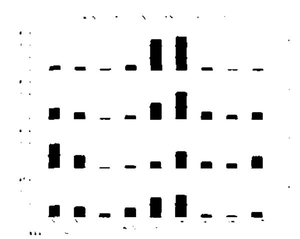
Northeast Cape



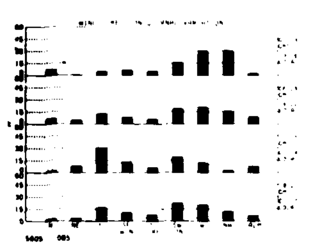
Nome



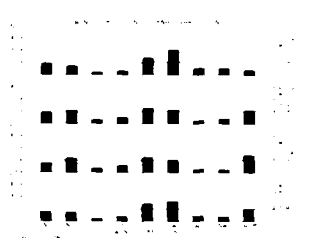
Moses Point



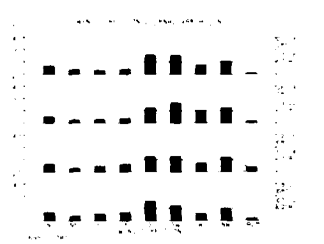
Unalakleet



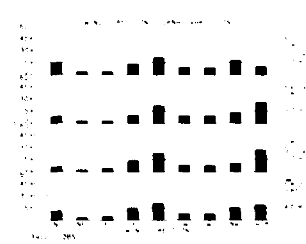
Cape Romanzof



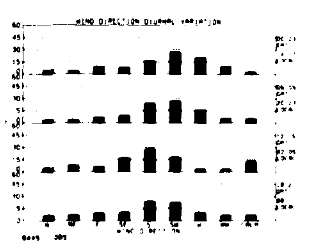
Bethel



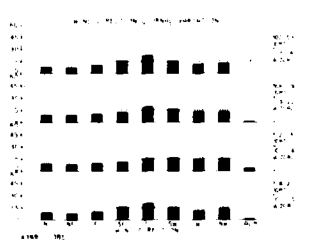
Cape Newenham



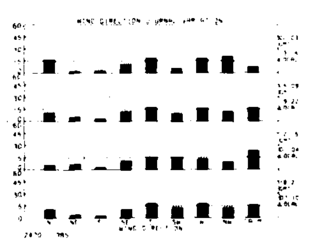
King Salmon



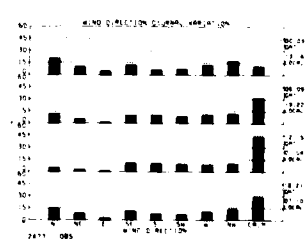
St. Paul

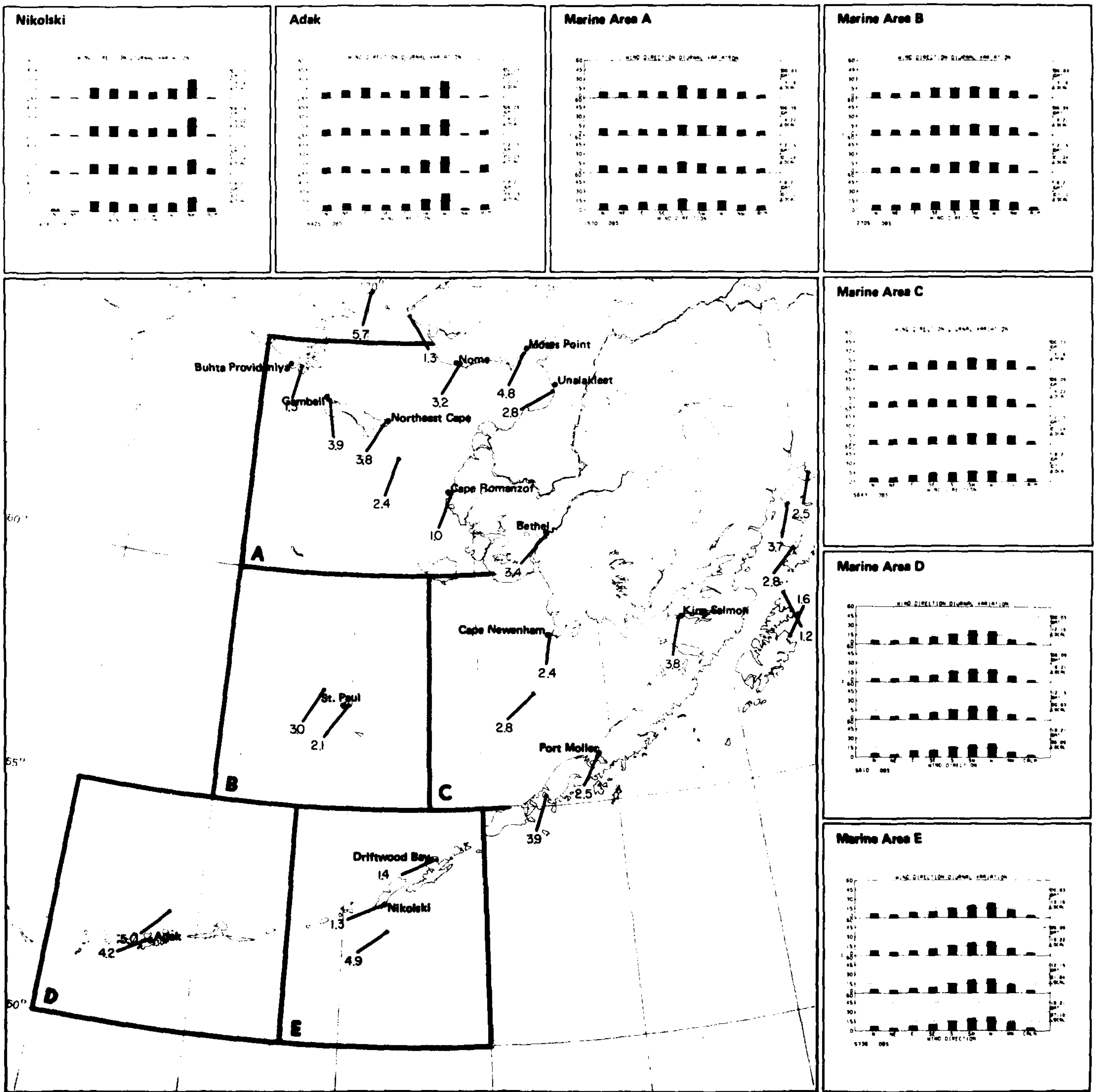


Port Moller



Driftwood Bay

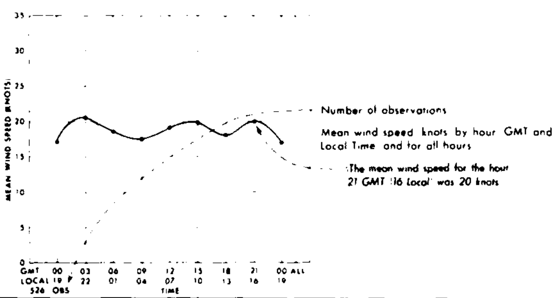




10 Vector mean wind **July**

Legend

Wind speed/diurnal variation

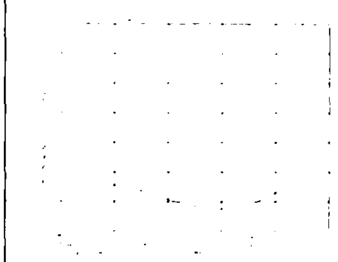


Map - Scalar mean wind

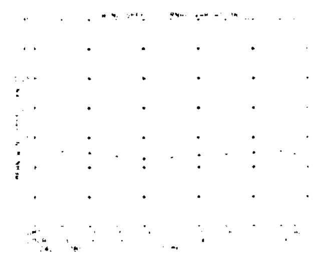
BLACK LINE Scalar mean wind knots

In areas of high persistence of direction the magnitude of the vector mean winds should closely approach that of the scalar mean winds. As most of the marine observations are recorded at six hour intervals, disregard the plots for other than 00 06 12 18 GMT hours on the marine area graphs.

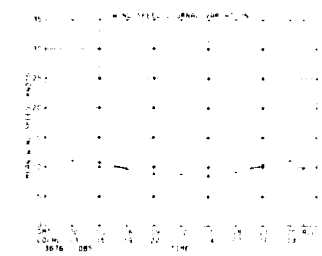
Buhta Provideniya



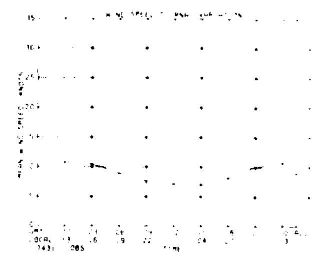
Gambell



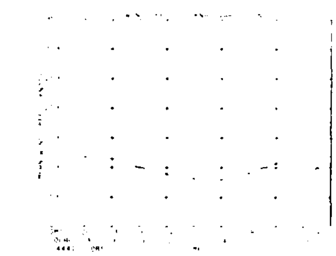
Northeast Cape



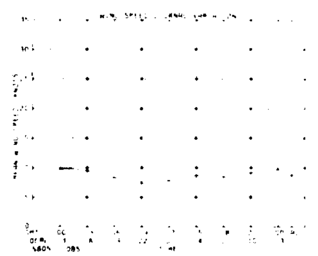
Nome



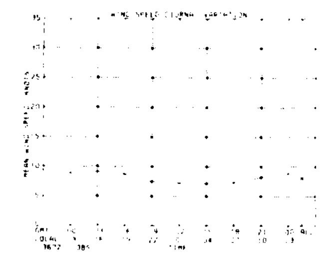
Moses Point



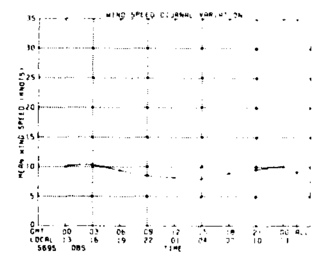
Unalakleet



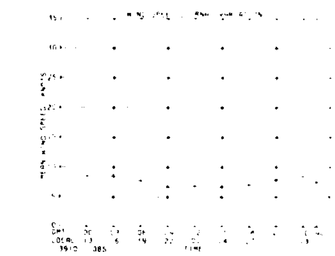
Cape Romanzof



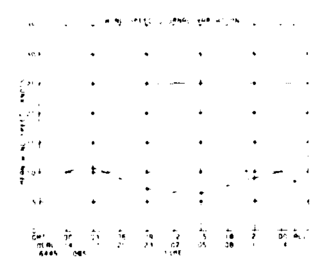
Bethel



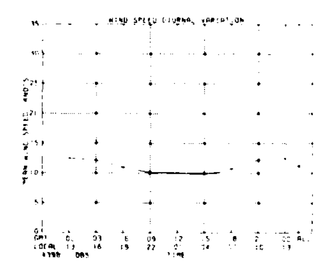
Cape Newenham



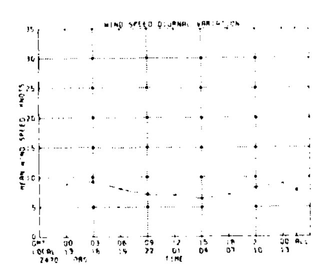
King Salmon



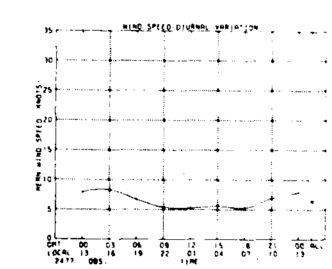
St. Paul

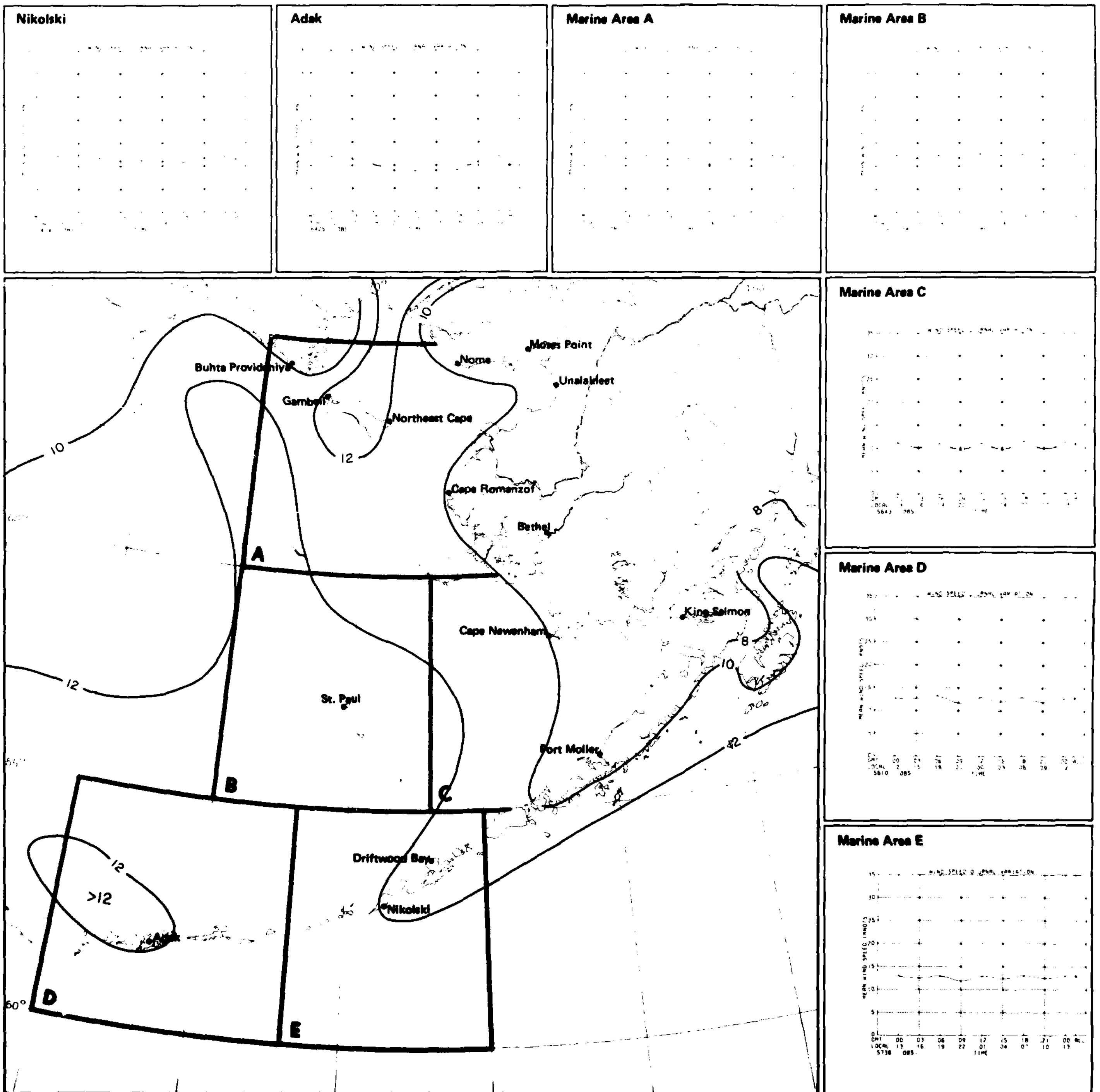


Port Moller



Driftwood Bay





11 Scalar mean wind **July**

Legend

Low cloud ceiling/visibility

Percent frequency of simultaneous occurrence of specified low cloud ceilings (hundreds of feet) and visibilities (nautical miles).

Low cloud ceiling heights are estimated from the height of low clouds (h) when low cloud amount (N_h) is ≥5/8

Obscurations are included under ceiling 0<1.5

N C (no ceiling) includes bases of clouds ≥8000 feet as well as occurrences of N_h <5/8

VISIBILITY

LOW CLOUD CEILING	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	0	0	•	3	13	64
50<80	0	0	0	0	•	1
35<50	0	•	0	0	0	4
20<35	0	•	1	1	2	2
10<20	0	•	1	1	2	1
6<10	0	1	0	•	•	0
3<6	•	•	0	•	•	0
1.5<3	•	0	0	0	0	0
0<1.5	•	0	0	0	0	0

334

(2% of all observations reported ceiling ≥1000 but <2000 feet simultaneously with visibility ≥5 but <10 nautical miles)

• indicates < 5% but >0

Number of observations

Map - Low cloud ceiling and visibility thresholds

BLACK LINE Percent frequency of low cloud ceiling ≥1000 feet (or no low cloud ceiling) and visibility ≥5 nautical miles

BLUE LINE Percent frequency of low cloud ceiling <600 feet and/or visibility <2 nautical miles

Buhta Provideniya

Gambell

VISIBILITY

LOW CLOUD CEILING	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	•	•	•	1	4	15
50<80	0	0	•	0	•	2
35<50	0	0	0	0	•	•
20<35	0	0	0	•	1	3
10<20	0	0	0	•	3	5
6<10	•	•	1	3	13	6
3<6	•	2	3	7	11	1
1.5<3	•	1	1	1	•	0
0<1.5	8	5	1	•	•	0

1215

Northeast Cape

VISIBILITY

LOW CLOUD CEILING	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	•	•	•	1	7	24
50<80	•	0	•	•	•	1
35<50	0	0	0	0	•	•
20<35	•	•	•	•	•	3
10<20	0	•	1	3	8	10
6<10	•	•	2	4	10	4
3<6	•	1	2	3	4	1
1.5<3	0	0	•	•	•	•
0<1.5	3	2	1	•	0	0

2513

Nome

VISIBILITY

LOW CLOUD CEILING	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	•	•	•	1	2	41
50<80	•	0	0	•	•	3
35<50	0	0	0	0	•	3
20<35	0	•	•	•	1	5
10<20	0	•	•	1	4	8
6<10	•	•	1	4	8	3
3<6	•	2	3	4	3	1
1.5<3	•	•	•	•	•	•
0<1.5	1	1	•	•	•	0

7123

Moses Point

VISIBILITY

LOW CLOUD CEILING	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	0	•	0	0	0	44
50<80	0	0	0	0	0	12
35<50	0	0	0	•	0	[illegible]
20<35	0	0	0	•	2	5
10<20	0	0	0	1	5	10
6<10	0	0	0	2	1	2
3<6	0	0	0	•	0	1
1.5<3	0	0	0	•	0	0
0<1.5	1	2	•	0	0	0

247

Unalakleet

Cape Romanzof

VISIBILITY

LOW CLOUD CEILING	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	•	•	•	2	13	13
50<80	0	•	0	•	1	•
35<50	0	0	0	0	•	•
20<35	0	0	0	•	2	3
10<20	0	•	•	1	6	5
6<10	0	•	1	3	13	5
3<6	0	1	2	6	7	1
1.5<3	•	•	•	•	•	0
0<1.5	6	4	1	•	0	0

2563

Bethel

VISIBILITY

LOW CLOUD CEILING	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	•	•	•	1	3	30
50<80	•	•	•	•	•	3
35<50	0	0	0	•	1	5
20<35	•	0	0	•	2	12
10<20	•	•	•	1	6	12
6<10	•	•	1	4	6	5
3<6	•	•	1	2	2	1
1.5<3	0	•	•	•	•	•
0<1.5	1	•	•	•	•	•

5634

Cape Newenham

VISIBILITY

LOW CLOUD CEILING	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	1	•	•	2	7	18
50<80	0	•	•	•	1	1
35<50	0	0	•	•	•	1
20<35	0	0	•	•	2	2
10<20	•	•	•	1	6	4
6<10	•	•	1	6	9	8
3<6	•	1	2	7	4	2
1.5<3	•	•	•	•	•	•
0<1.5	5	3	2	1	•	0

2328

King Salmon

VISIBILITY

LOW CLOUD CEILING	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	1	•	•	1	2	35
50<80	•	0	•	•	•	5
35<50	0	0	0	•	1	6
20<35	0	0	•	•	2	12
10<20	•	•	•	1	5	9
6<10	•	•	1	2	4	2
3<6	•	•	1	3	2	1
1.5<3	•	•	•	•	•	•
0<1.5	2	1	1	•	•	0

6340

St. Paul

VISIBILITY

LOW CLOUD CEILING	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	1	•	•	•	6	4
50<80	•	•	0	0	•	•
35<50	•	0	•	•	•	•
20<35	•	•	•	•	3	2
10<20	•	•	•	1	10	3
6<10	•	•	1	3	8	1
3<6	1	3	6	9	8	1
1.5<3	1	1	1	1	•	•
0<1.5	16	4	2	•	0	•

4376

Port Moller

Insufficient Data

Driftwood Bay

Insufficient Data

Nikolski

Insufficient Data

Adak

LOW CLOUD CEILING / VISIBILITY

	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	•	•	•	1	7	4
50<80	0	•	0	0	•	•
35<50	0	0	0	0	•	•
20<35	0	•	0	•	4	1
10<20	•	•	•	4	22	1
6<10	0	•	2	11	17	1
3<6	•	1	3	7	6	•
1.5<3	•	•	•	1	•	0
0<1.5	2	2	1	1	•	0

6436

Marine Area A

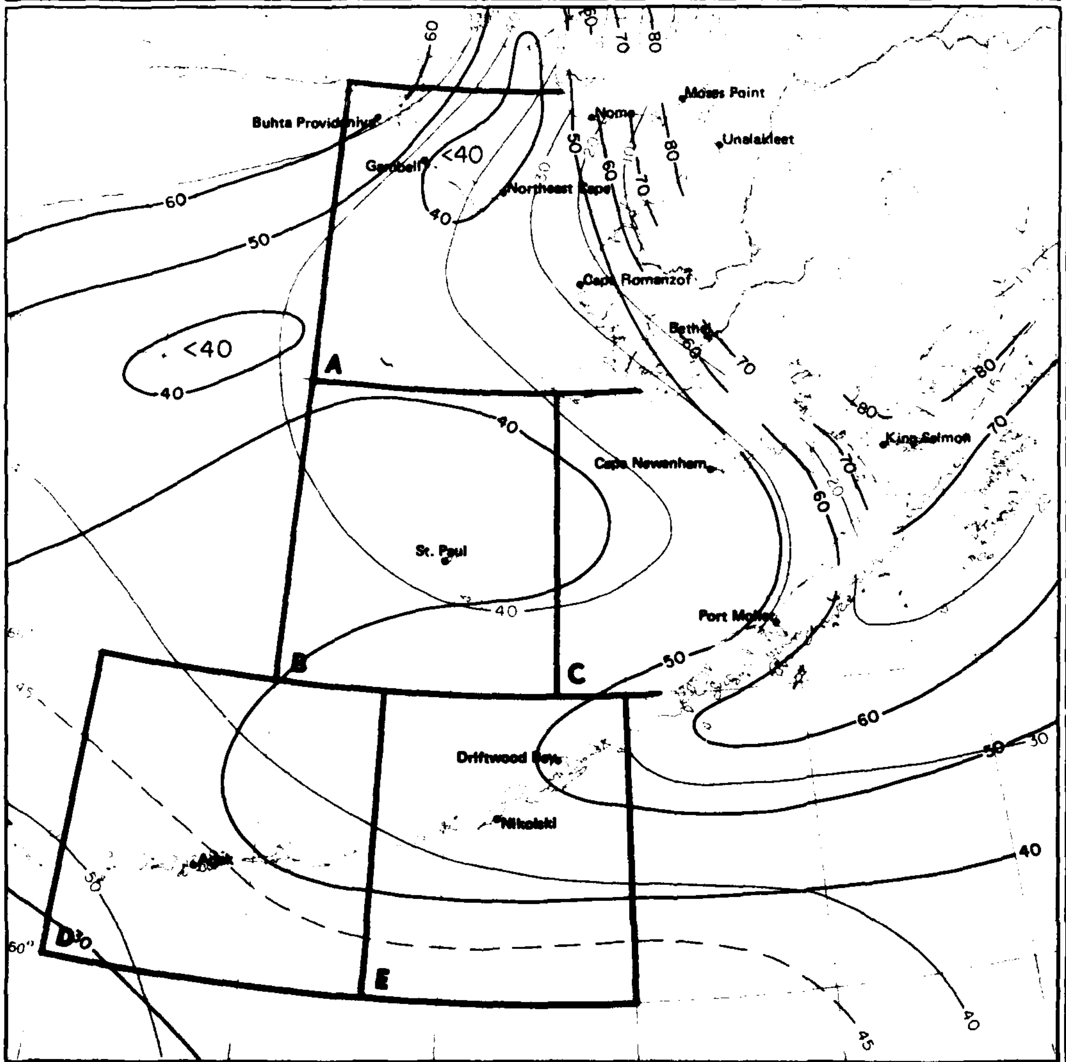
Marine Area B

Marine Area C

576

Marine Area D

447



Marine Area E

LOW CLOUD CEILING / VISIBILITY

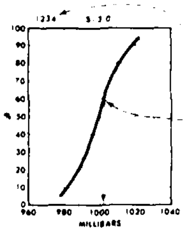
	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	•	•	•	•	[illegible]	6
50<80	[illegible]	[illegible]	•	•	•	1
35<50	•	•	•	•	1	•
20<35	•	•	•	1	4	[illegible]
10<20	1	•	1	5	4	10
6<10	1	1	1	4	[illegible]	5
3<6	•	•	•	2	2	1
1.5<3	•	•	•	•	1	•
0<1.5	17	3	2	2	1	•

4819

12 Low cloud ceiling and visibility thresholds **July**

Legend

Sea level pressure



- Number of observations

Cumulative percent frequency of sea level pressures equal to or less than the pressure intersected by the curve

S Standard deviation of pressure mbs

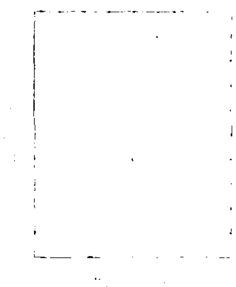
60% of all observed sea level pressures were ≤1002 millibars

Map - Mean sea level pressure

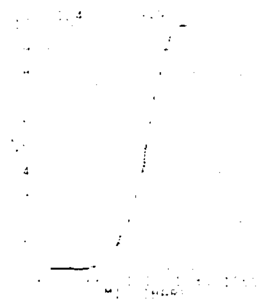
BLACK LINE Mean sea level pressure millibars

Sea level pressure is one of the most frequently recorded elements but one of the least accurate because of instrument and coding errors. Despite the inaccuracies of the individual readings however the large scale patterns and mean gradients of the isopleth analyses are relatively accurate

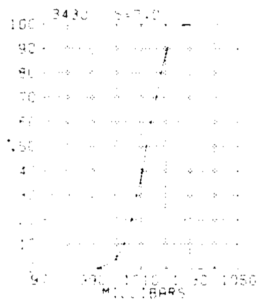
Buhta Provideniya



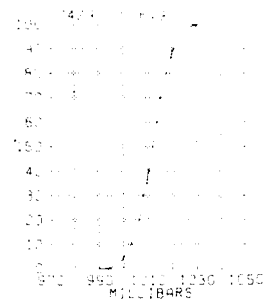
Gambell



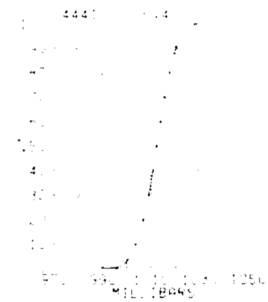
Northeast Cape



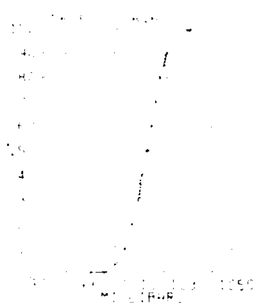
Nome



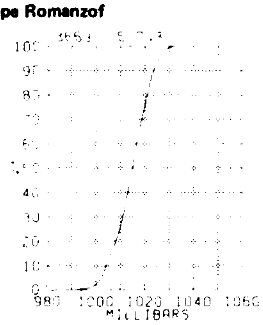
Moses Point



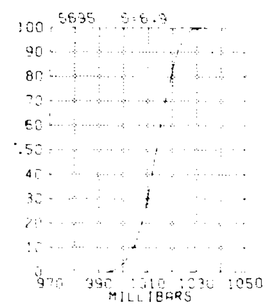
Unalakleet



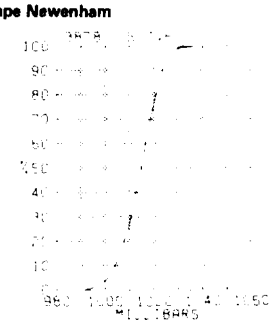
Cape Romanzof



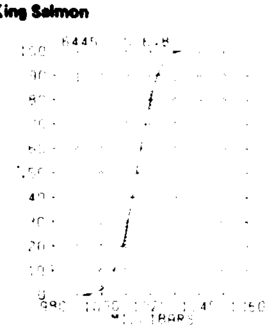
Bethel



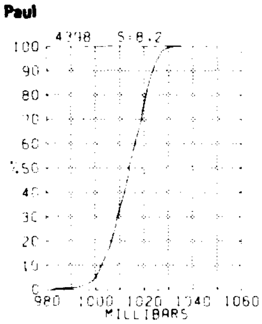
Cape Newenham



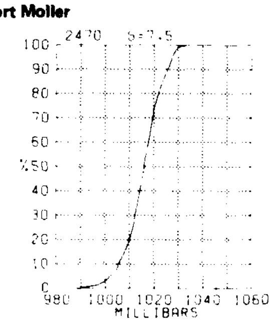
King Salmon



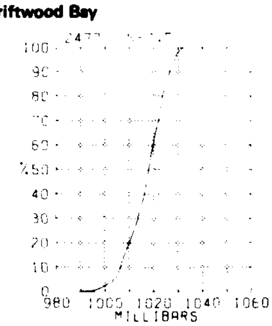
St. Paul

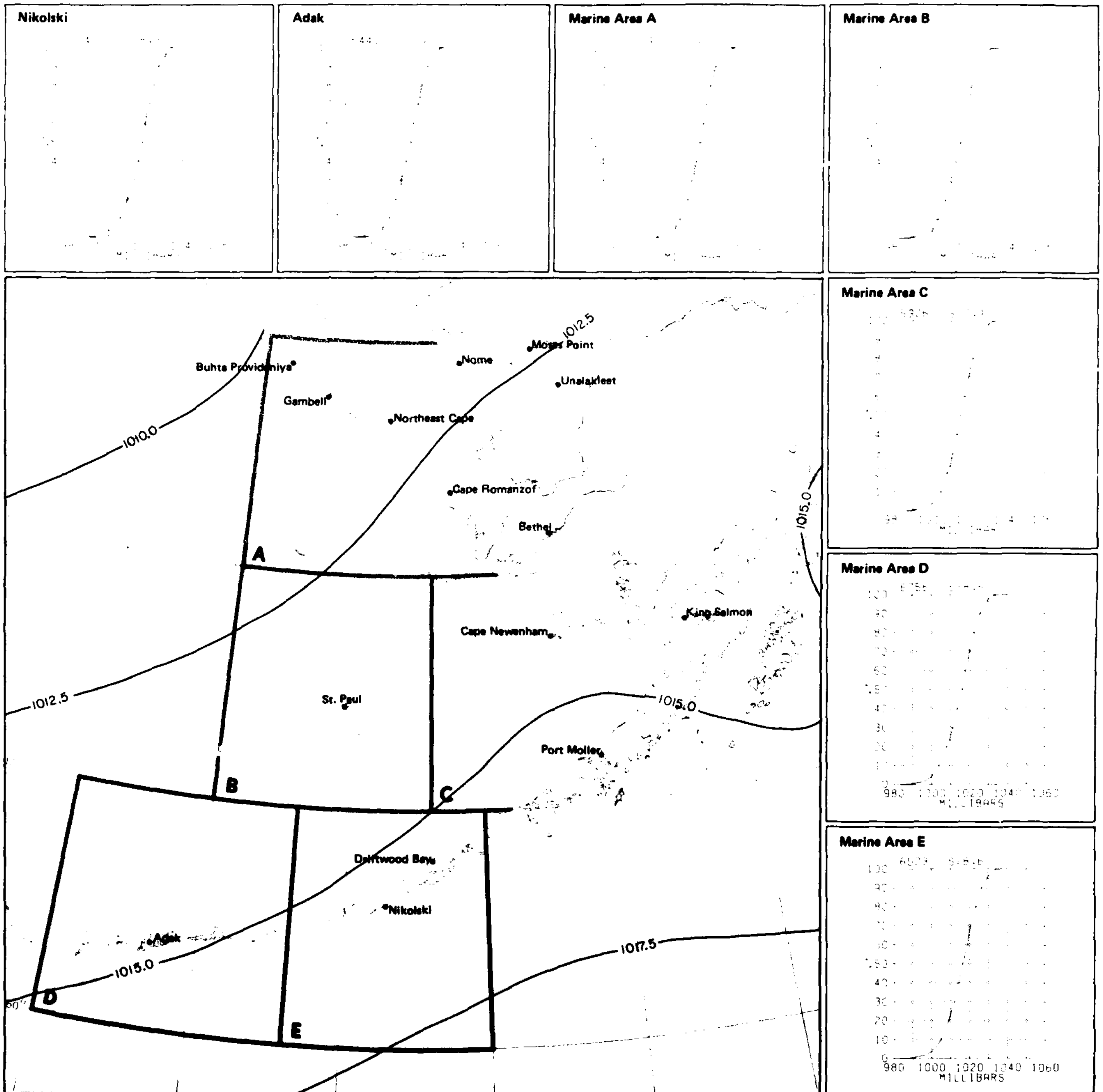


Port Moller



Driftwood Bay



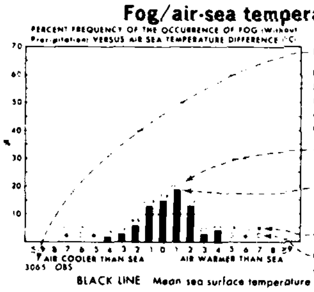


13 Mean sea level pressure

July

Legend

Fog/air-sea temperature difference



Number of observations

Bars show the percentage of observations with Fog (without Precipitation) for each Air Sea temperature difference category. Plotted numbers indicate the percentage of observations in each Air-Sea temperature difference category

(22.7% of all observations had Air Sea temperature difference of +1 °C)

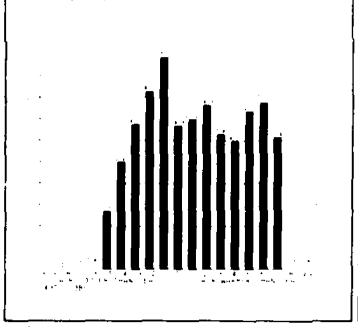
(19% of all observations with Air-Sea temperature difference of +1 °C were accompanied by Fog (without Precipitation))

• indicates < 0.5% but > 0

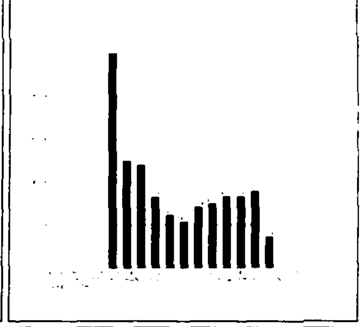
0 indicates no fog with the Air Sea temperature difference category

BLACK LINE Mean sea surface temperature (°C)

Marine Area A

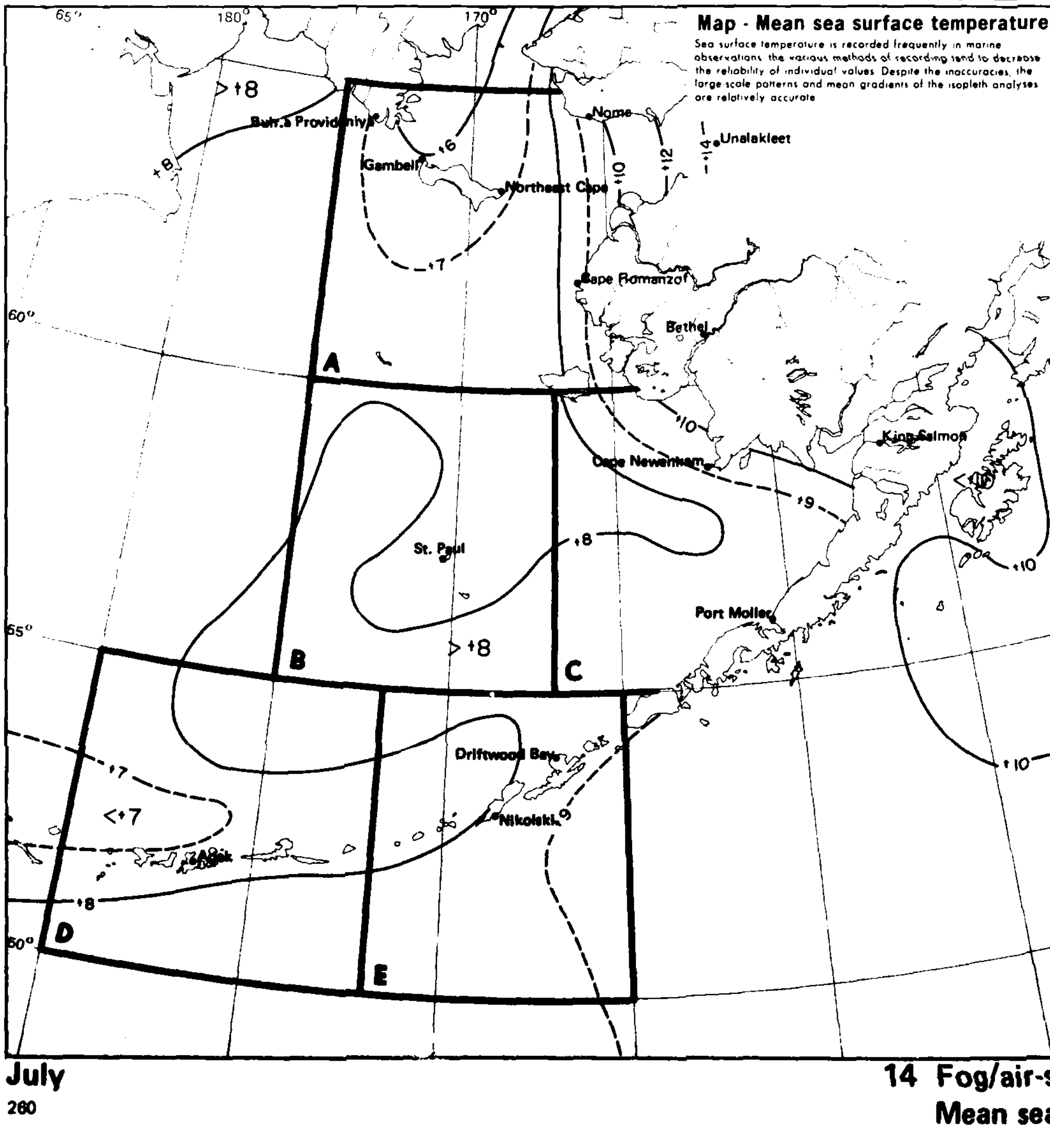


Marine Area B

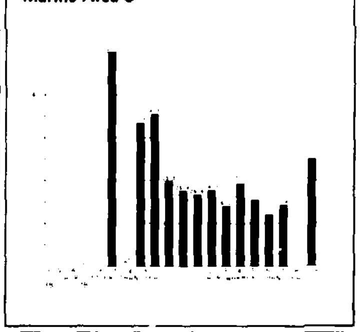


Map - Mean sea surface temperature

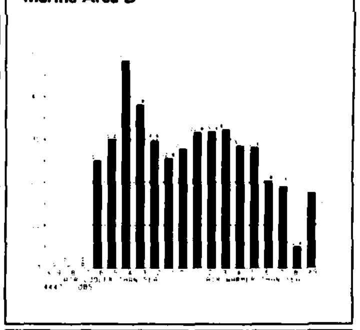
Sea surface temperature is recorded frequently in marine observations, the various methods of recording tend to decrease the reliability of individual values. Despite the inaccuracies, the large-scale patterns and mean gradients of the isopleth analyses are relatively accurate



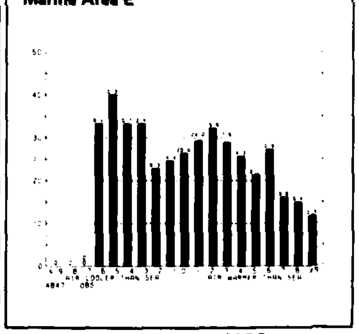
Marine Area C



Marine Area D



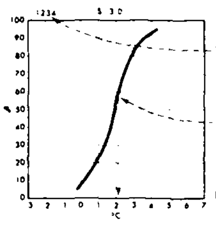
Marine Area E



14 Fog/air-sea temperature difference
Mean sea surface temperature

Legend

Sea surface temperature



Number of observations

Cumulative percent frequency of sea surface temperatures equal to or less than the temperature intersected by the curve

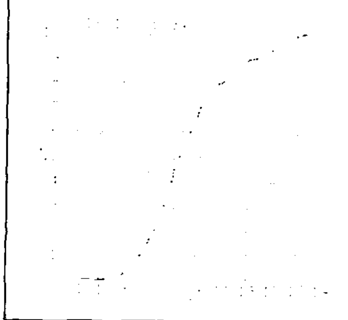
(60% of all observed sea surface temperatures were ≤2.1°C or ≤35.8°F)

S Standard deviation of sea surface temperatures (°C)

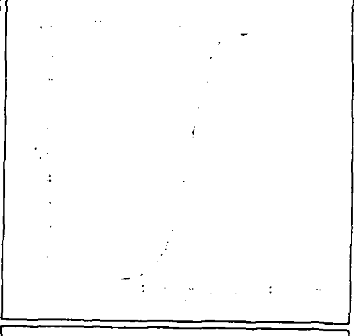
BLACK LINE Maximum (99%) sea surface temperature (°C) (1% of the temperatures were greater than the given value)

BLUE LINE Minimum (1%) sea surface temperature (°C) (1% of the temperatures were equal to or less than the given value)

Marine Area A

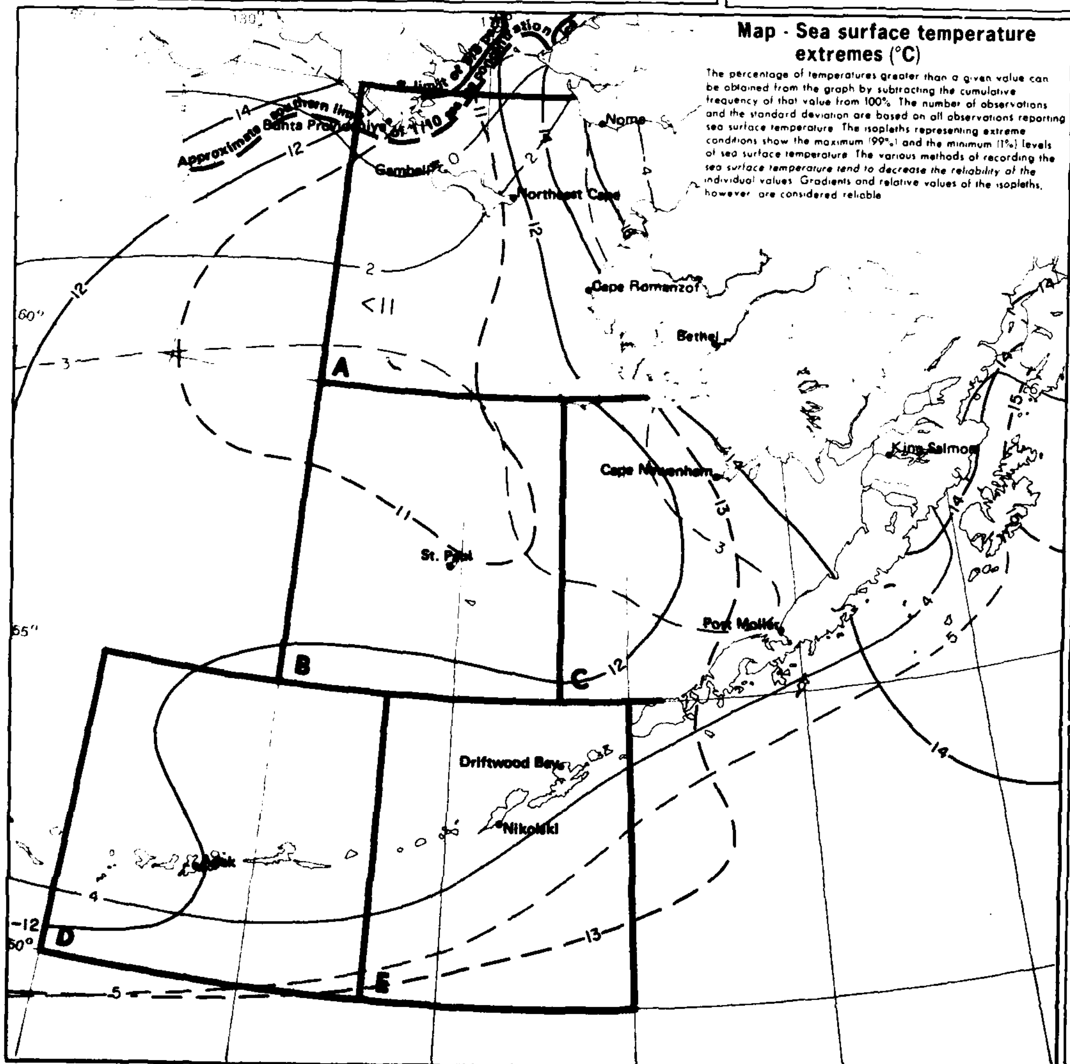


Marine Area B

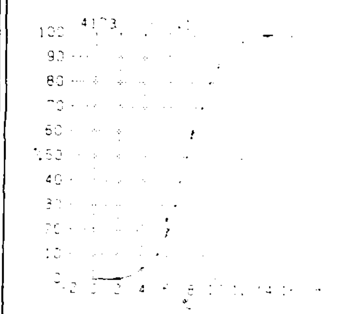


Map - Sea surface temperature extremes (°C)

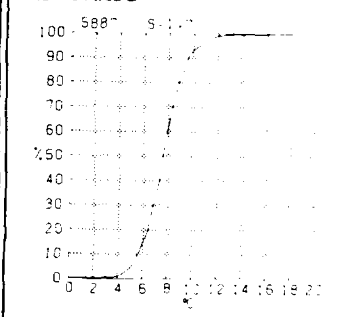
The percentage of temperatures greater than a given value can be obtained from the graph by subtracting the cumulative frequency of that value from 100%. The number of observations and the standard deviation are based on all observations reporting sea surface temperature. The isopleths representing extreme conditions show the maximum (99%) and the minimum (1%) levels of sea surface temperature. The various methods of recording the sea surface temperature tend to decrease the reliability of the individual values. Gradients and relative values of the isopleths, however, are considered reliable.



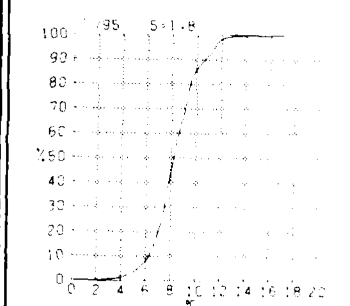
Marine Area C



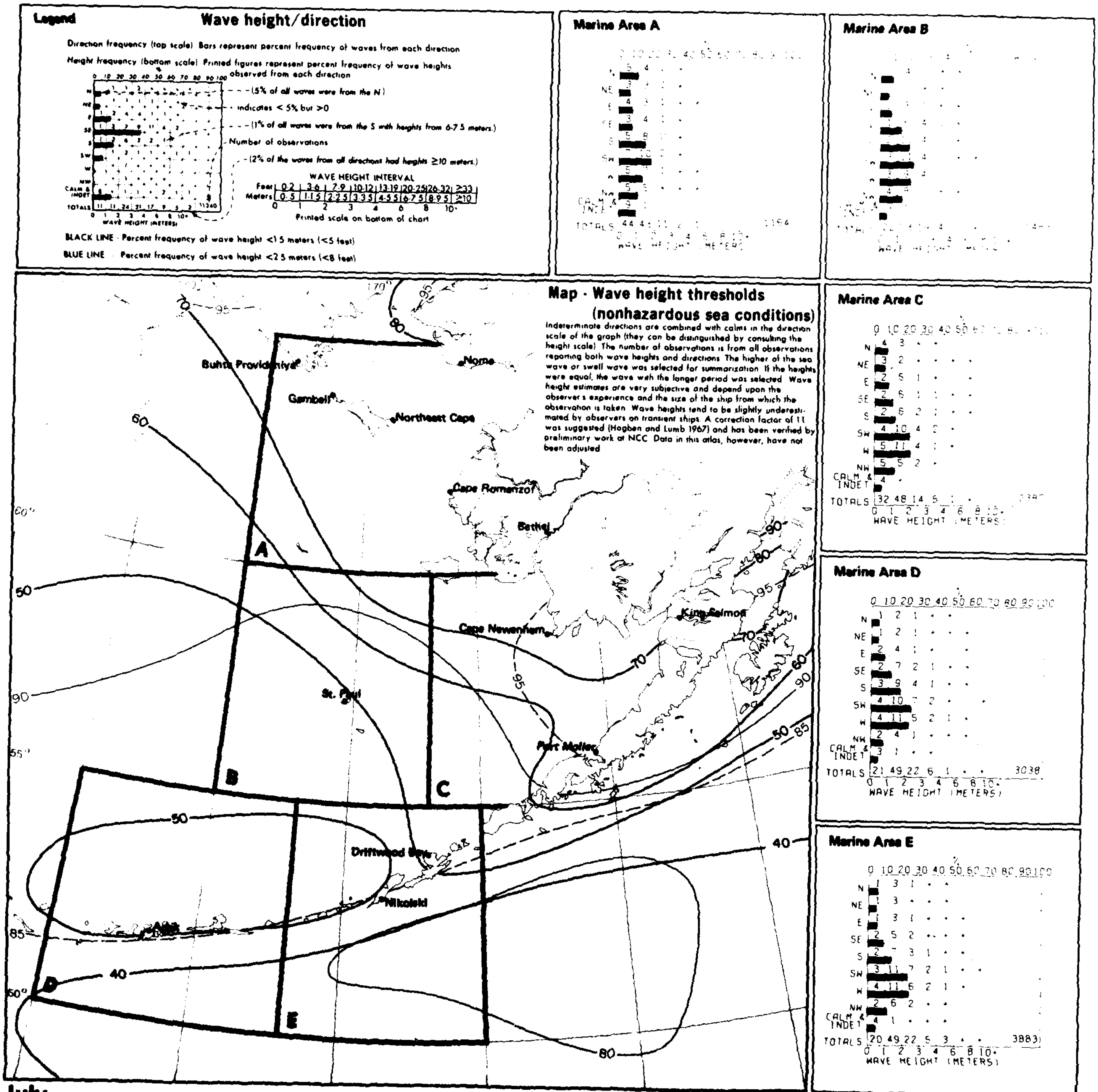
Marine Area D



Marine Area E



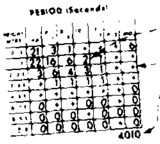
15 Sea surface temperature extremes



16 Wave height thresholds (nonhazardous)

Legend

Wave height/period



Percent frequency of occurrence of wave period and height

(12% of observed waves had a height of 1-1.5 meters and a period of 10-11 seconds.)

• indicates < 5% but >0

Number of observations

Waves are selected on the basis of the higher of sea and swell when both are reported. If both heights are equal, the wave with the longer period is selected

BLACK LINE Percent frequency of wave height ≥3.5 meters (≥12 feet)

BLUE LINE Percent frequency of wave height ≥6 meters (≥20 feet)

BLUE NUMBER Maximum observed wave height (meters)

Marine Area A

1273

Marine Area B

Marine Area C

PERIOD (SECONDS)

HEIGHT (MTRS)	<6	6-7	8-9	10-11	12-13	>13	IND
0-.5	[illegible]	[illegible]	[illegible]	•	•	•	4
1-1.5	25	16	[illegible]	•	•	•	[illegible]
2-2.5	3	6	4	[illegible]	•	•	•
3-3.5	•	1	2	[illegible]	[illegible]	•	•
4-5.5	•	0	•	•	•	•	[illegible]
6-7.5	0	0	[illegible]	•	•	[illegible]	[illegible]
8-9.5	0	0	[illegible]	0	0	0	[illegible]
≥10	0	0	0	0	0	0	0

2501

Marine Area D

PERIOD (SECONDS)

HEIGHT (MTRS)	<6	6-7	8-9	10-11	12-13	>13	IND
0-.5	15	2	2	•	•	•	4
1-1.5	22	16	5	1	•	•	•
2-2.5	4	8	6	2	•	•	•
3-3.5	1	2	2	1	•	•	•
4-5.5	0	•	•	•	•	•	•
6-7.5	0	•	•	•	•	•	0
8-9.5	0	0	0	0	0	•	•
≥10	0	0	0	0	0	0	0

3157

Marine Area E

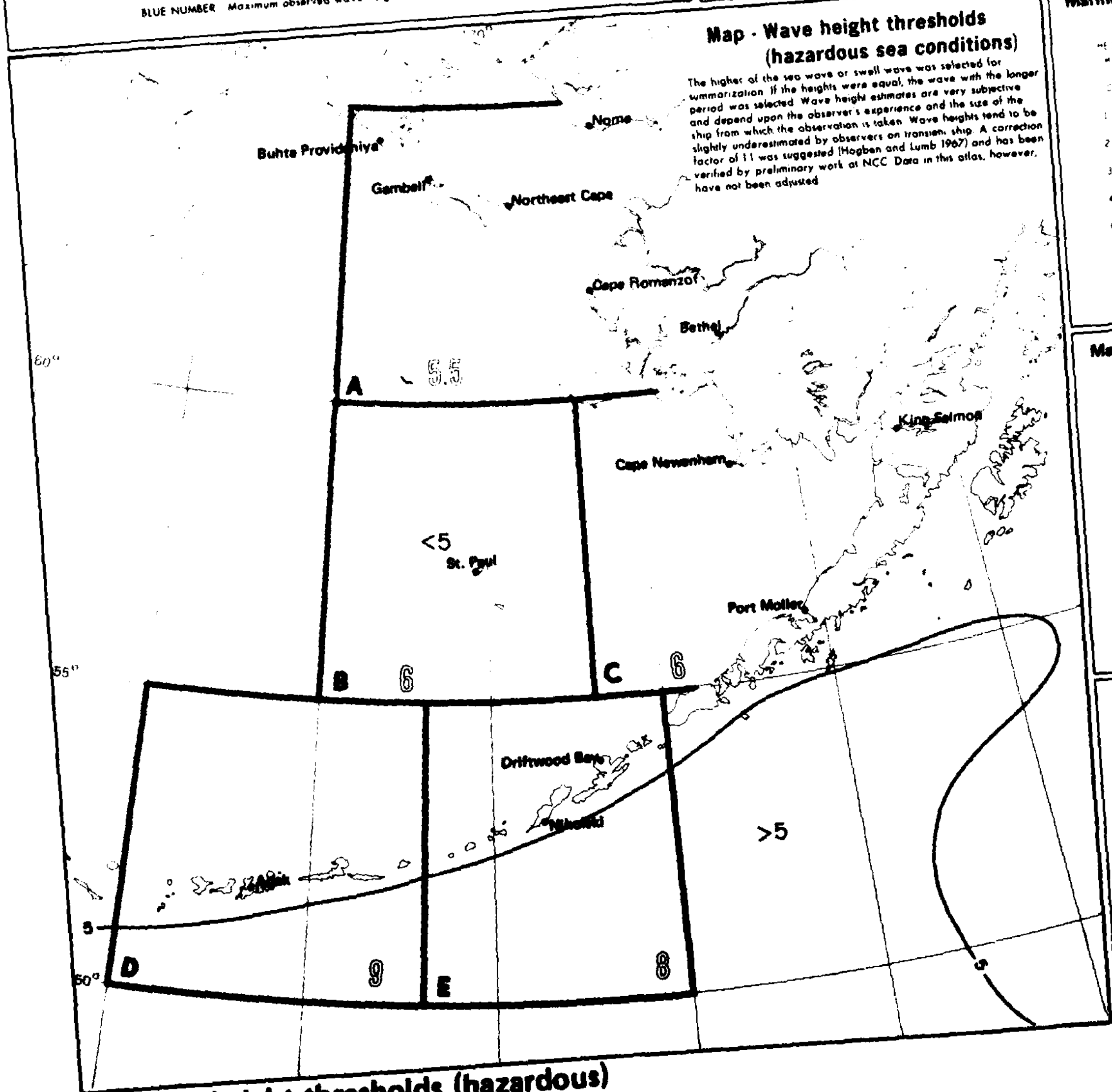
PERIOD (SECONDS)

HEIGHT (MTRS)	<6	6-7	8-9	10-11	12-13	>13	IND
0-.5	14	2	1	•	0	0	5
1-1.5	21	18	5	1	•	•	2
2-2.5	4	9	6	2	•	•	•
3-3.5	1	2	2	1	•	•	•
4-5.5	•	1	1	•	•	•	•
6-7.5	0	•	•	•	•	0	•
8-9.5	0	0	0	0	•	0	0
≥10	0	0	0	0	0	0	0

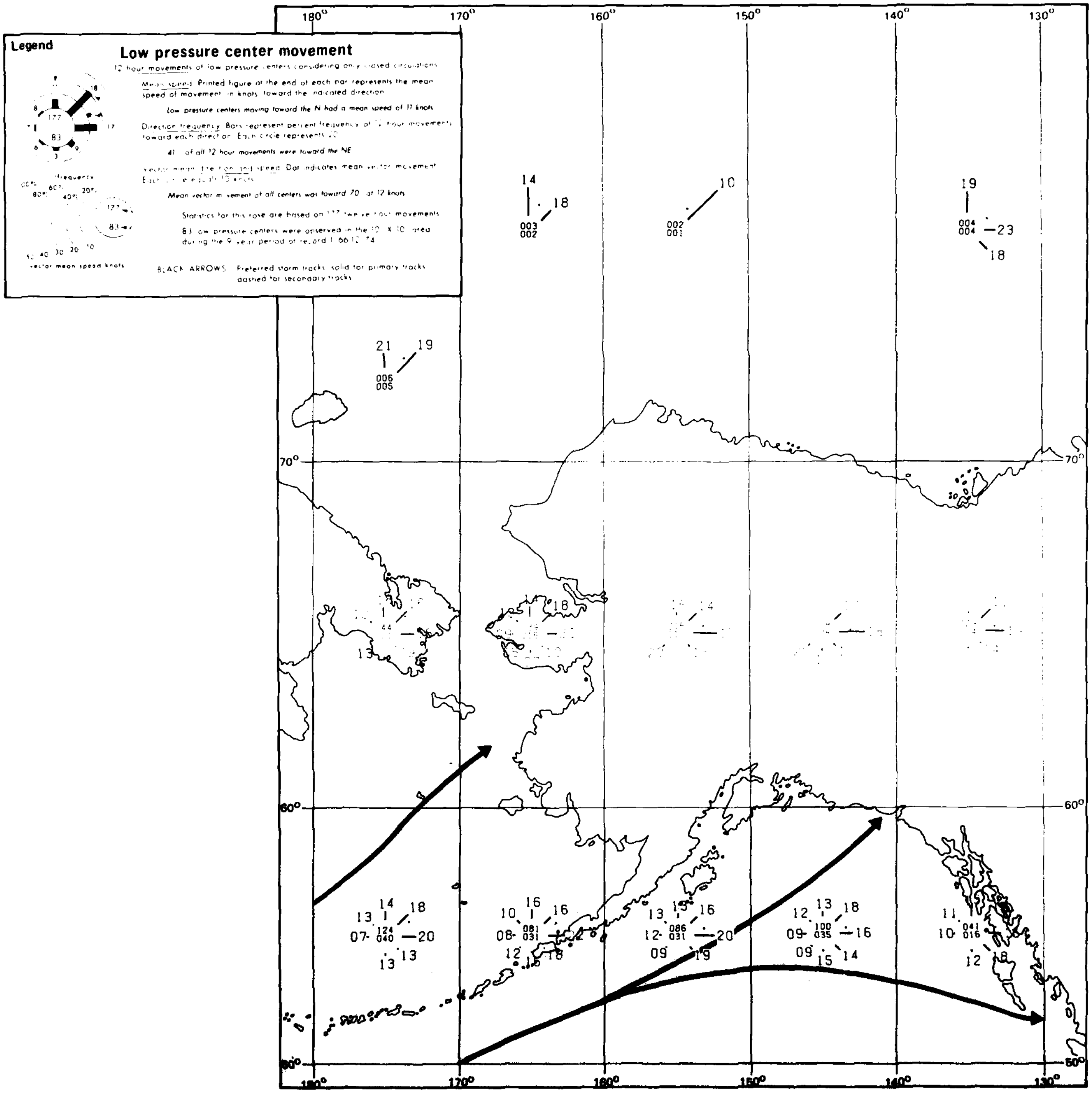
4031

Map - Wave height thresholds (hazardous sea conditions)

The higher of the sea wave or swell wave was selected for summarization. If the heights were equal, the wave with the longer period was selected. Wave height estimates are very subjective and depend upon the observer's experience and the size of the ship from which the observation is taken. Wave heights tend to be slightly underestimated by observers on transient ship. A correction factor of 1.1 was suggested (Hogben and Lumb 1967) and has been verified by preliminary work at NCC. Data in this atlas, however, have not been adjusted.



17 Wave height thresholds (hazardous)

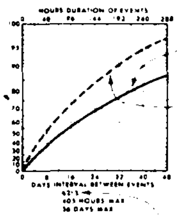


July

18 Low pressure center movement

Legend

Persistence of visibility <2 n. mi.



Hours duration of events · Days interval between events

Cumulative percent frequency of hours duration equal to or less than the number of hours intersected by the solid curve

(80% of the events had a duration ≤216 hours)

Cumulative percent frequency of days interval between events equal to or less than the number of days intersected by the broken curve

(88% of the events were followed by another event in 28 days or less)

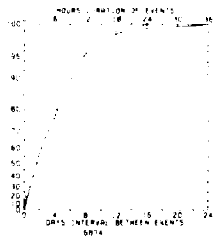
The maximum value(s) of hours duration and/or the days interval will be displayed when the graph limits are exceeded

Durations and intervals for a particular month extend from the time they begin (or the first of the month if already in progress) and are terminated at the actual ending time, regardless of what month that may be

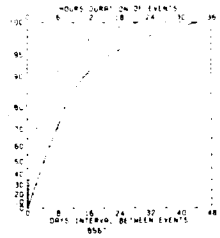
Number of observations

Top and bottom scales are variable to allow for variations in the data

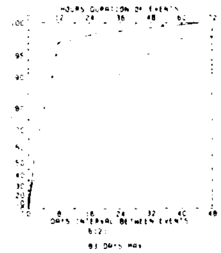
Adak



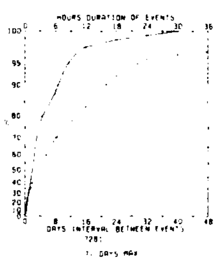
Nome



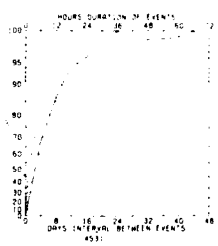
Moses Point



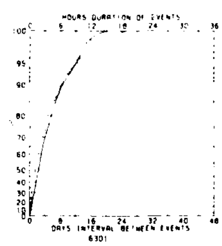
Unalakleet



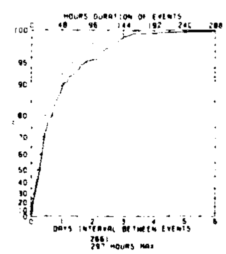
Cape Romanzof



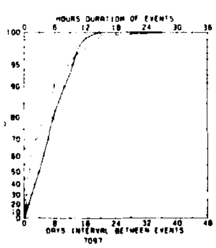
Bethel



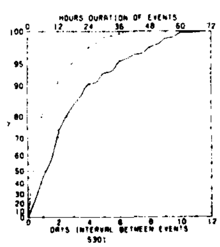
Nikolski



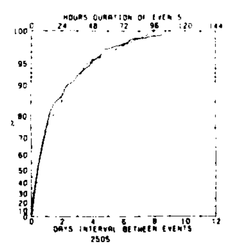
King Salmon



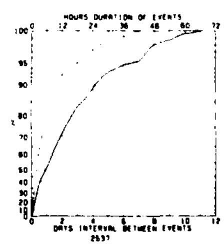
St. Paul



Port Moller



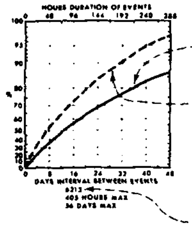
Driftwood Bay



19 Persistence of visibility <2 n. mi. **July**

Legend

Persistence of wind ≥10 kts.



Hours duration of events · Days interval between events

Cumulative percent frequency of hours duration equal to or less than the number of hours intersected by the solid curve.

– – – *(80% of the events had a duration ≤216 hours.)*

Cumulative percent frequency of days interval between events equal to or less than the number of days intersected by the broken curve.

– – – *(88% of the events were followed by another event in 28 days or less.)*

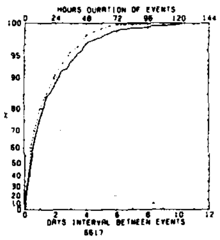
The maximum value(s) of hours duration and/or the days interval will be displayed when the graph limits are exceeded.

Durations and intervals for a particular month extend from the time they begin (or the first of the month if already in progress) and are terminated at the actual ending time, regardless of what month that may be.

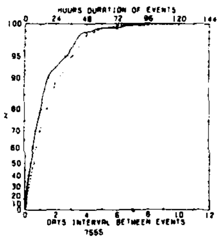
Number of observations.

Top and bottom scales are variable to allow for variations in the data.

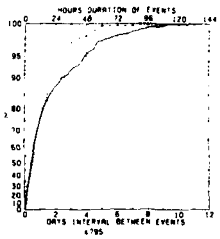
Adak



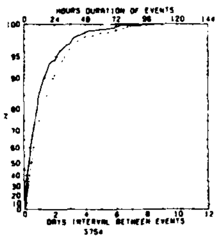
Nome



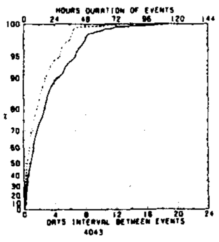
Moses Point



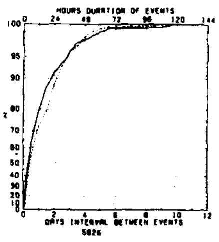
Unalakleet



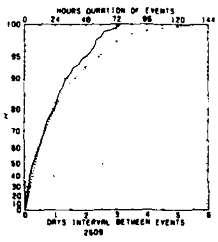
Cape Romanzof



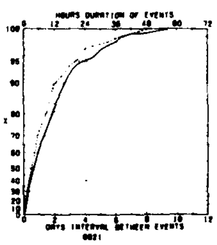
Bethel



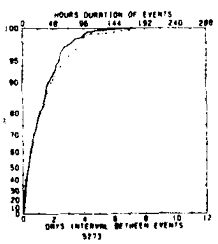
Nikolski



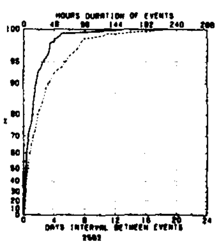
King Salmon



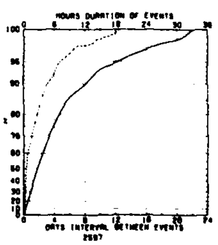
St. Paul



Port Moller

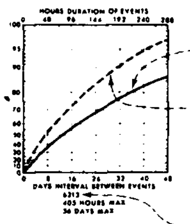


Driftwood Bay



Legend

Persistence of wind ≥20 kts.



Hours duration of events · Days interval between events

Cumulative percent frequency of hours duration equal to or less than the number of hours intersected by the solid curve

(80% of the events had a duration ≤216 hours.)

Cumulative percent frequency of days interval between events equal to or less than the number of days intersected by the broken curve

(88% of the events were followed by another event in 28 days or less.)

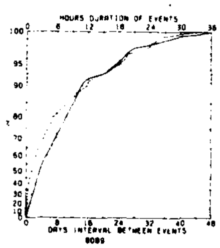
The maximum value(s) of hours duration and/or the days interval will be displayed when the graph limits are exceeded

Durations and intervals for a particular month extend from the time they begin (or the first of the month if already in progress) and are terminated at the actual ending time, regardless of what month that may be

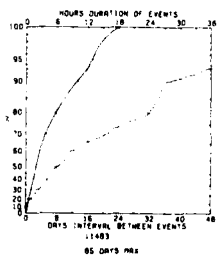
Number of observations

Top and bottom scales are variable to allow for variations in the data

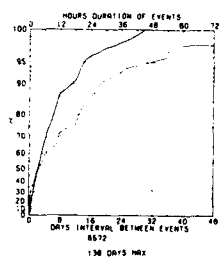
Adak



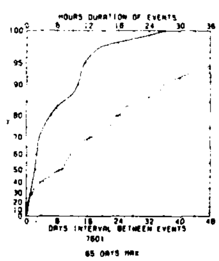
Nome



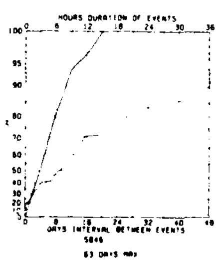
Moses Point



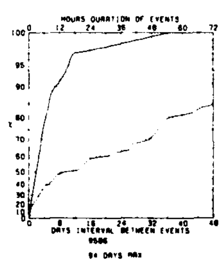
Unalakleet



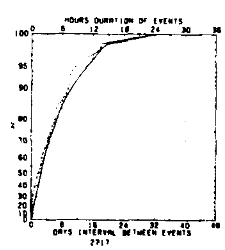
Cape Romanzof



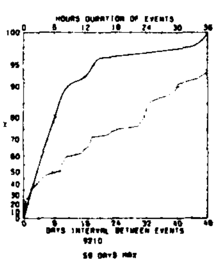
Bethel



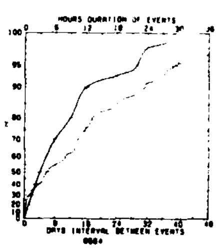
Nikolski



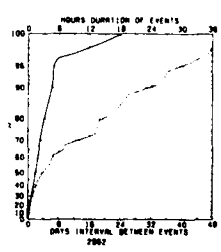
King Salmon



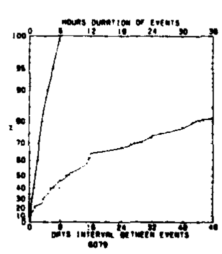
St. Paul



Port Moller



Driftwood Bay

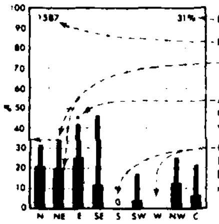


Legend

Precipitation/wind direction

% Pcpn — % Liquid, % Snow

Percent frequency of surface wind observations from each direction and calm that were accompanied by precipitation, subdivided into liquid type (including freezing rain and freezing drizzle) and snow



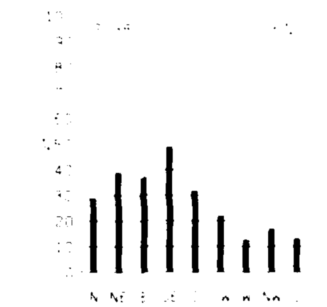
- Percentage of present weather observations reporting precipitation
- Number of observations
- 34% of all NE winds were accompanied by precipitation, of which 14% was liquid and 20% was snow
- An asterisk in the column for a given direction (or calm) indicates that the percentage was based on 10-30 observations of present weather and wind direction
- 0 replaces bar when no precipitation was observed with winds from a given direction (or calm). No bar graph is presented if less than 10 observations containing present weather were reported for a given direction (or calm).

Map · Precipitation

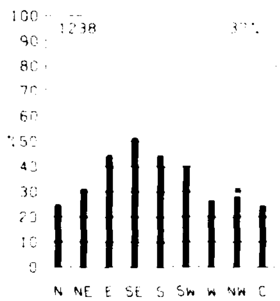
BLACK LINE Percent frequency of observations reporting precipitation

Of all the elements recorded in historical marine observations, precipitation is one of those most subject to interpretation error, from coding practices, observers preference for certain present weather codes, and other biases.

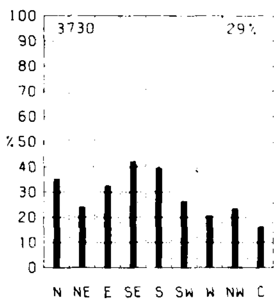
Buhta Provideniya



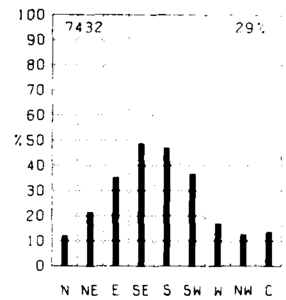
Gambell



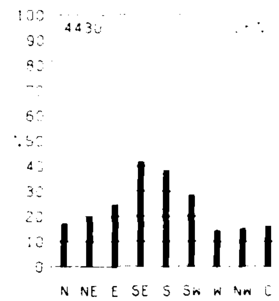
Northeast Cape



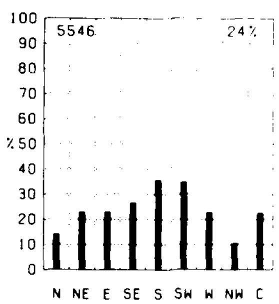
Nome



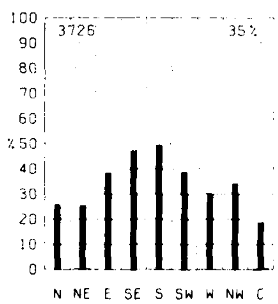
Moses Point



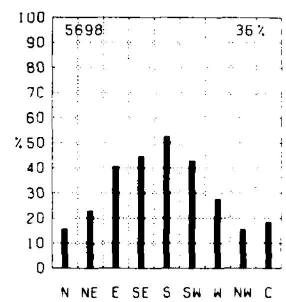
Unalakleet



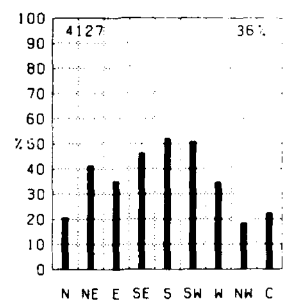
Cape Romanzof



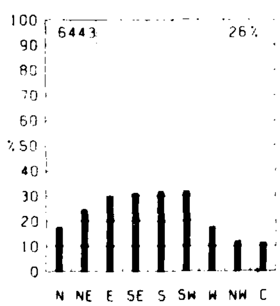
Bethel



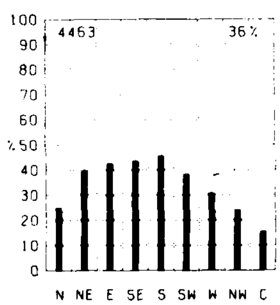
Cape Newenham



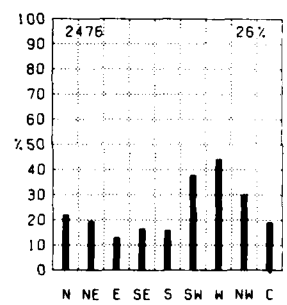
King Salmon



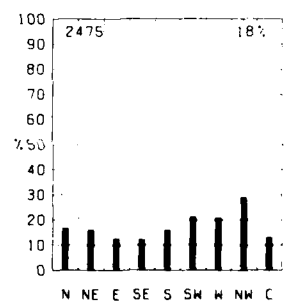
St. Paul

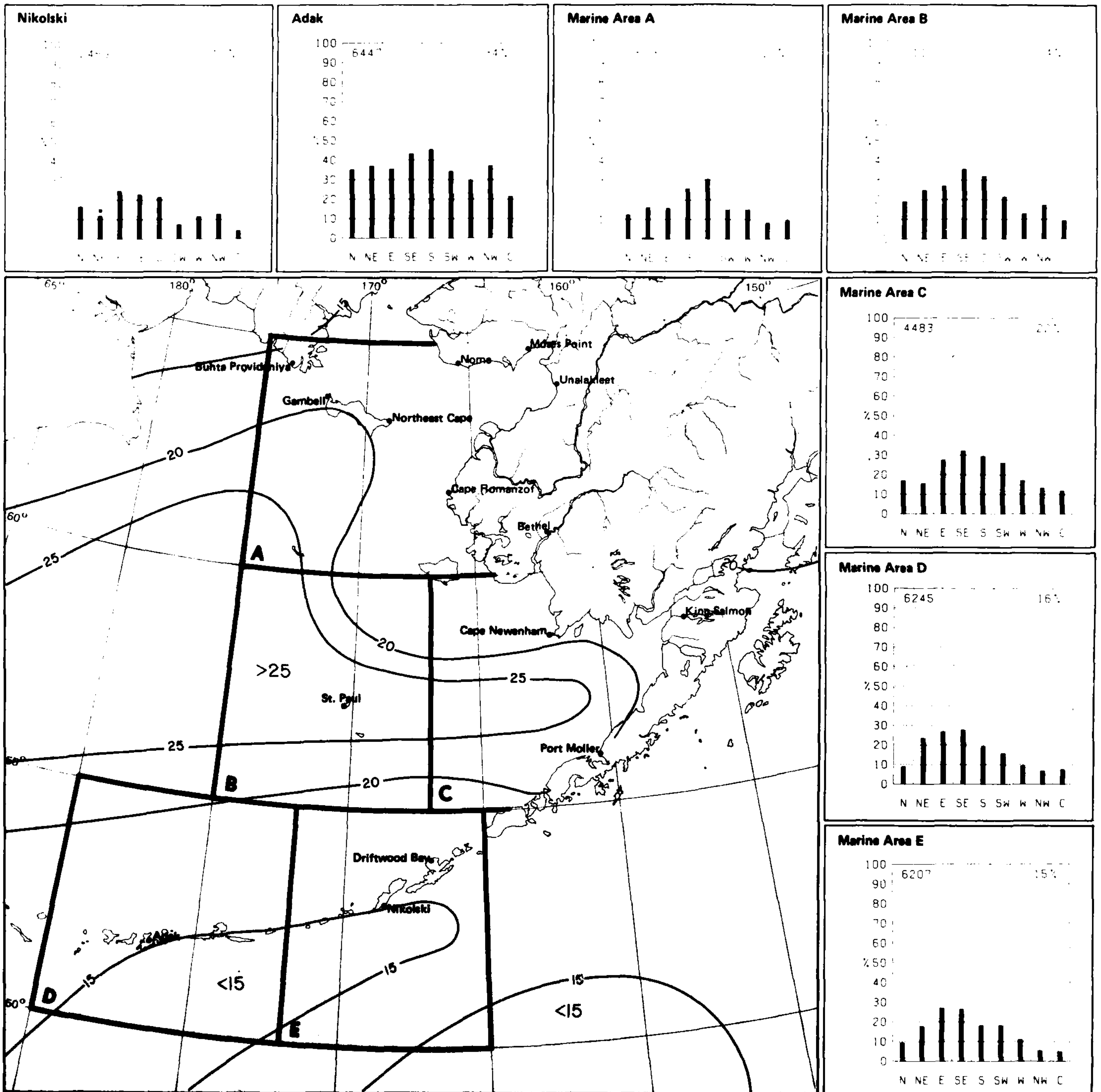


Port Moller



Driftwood Bay

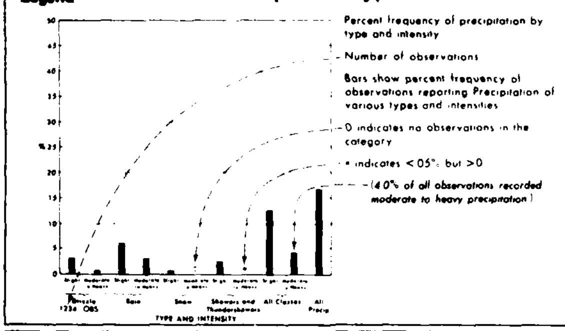




1 Precipitation **August**

Precipitation types

Legend

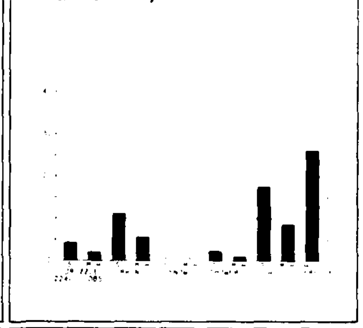


Map - Snow

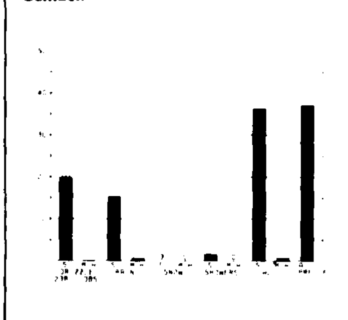
BLACK LINE Percent frequency of precipitation observations reporting snow

The percent frequency of observations reporting snow for a given point can be determined by multiplying the percent frequency of observations reporting precipitation (map 1) with that of precipitation observations reporting snow (map 2

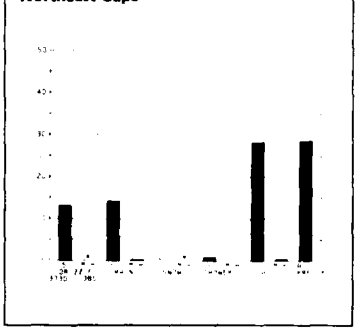
Buhta Provideniya



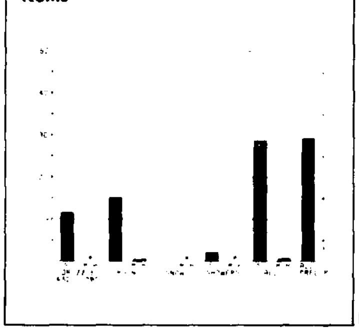
Gambell



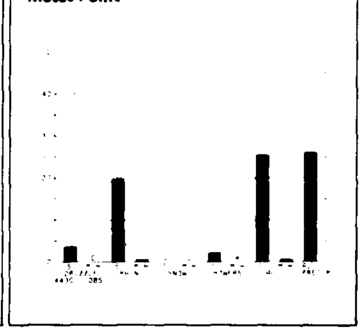
Northeast Cape



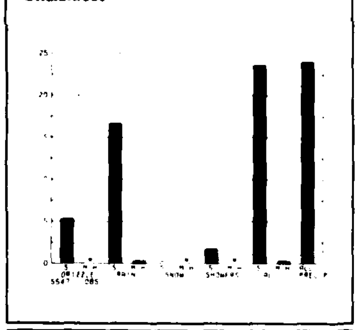
Nome



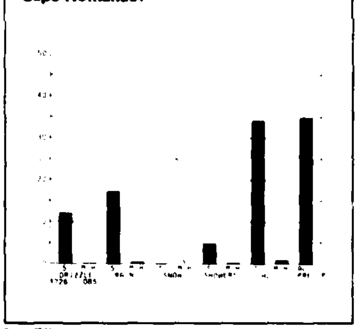
Moses Point



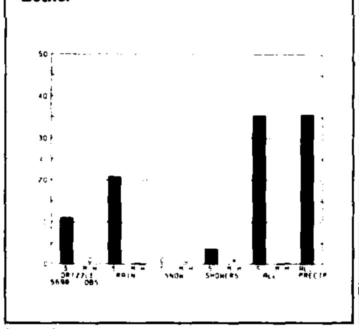
Unalakleet



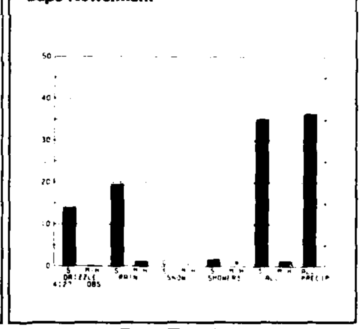
Cape Romanzof



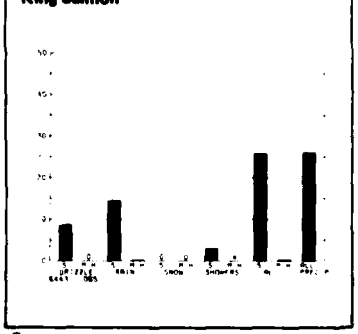
Bethel



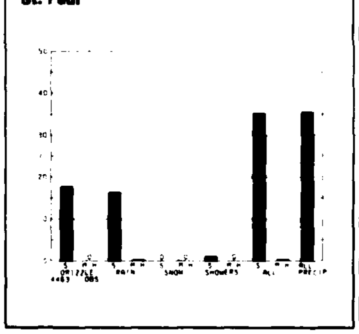
Cape Newenham



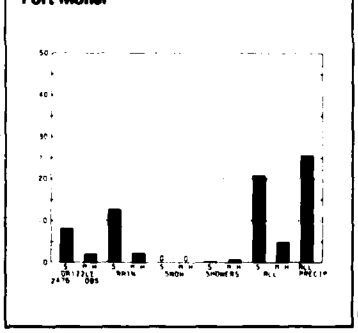
King Salmon



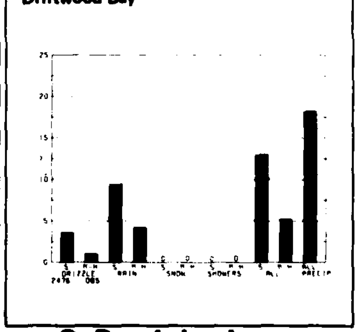
St. Paul

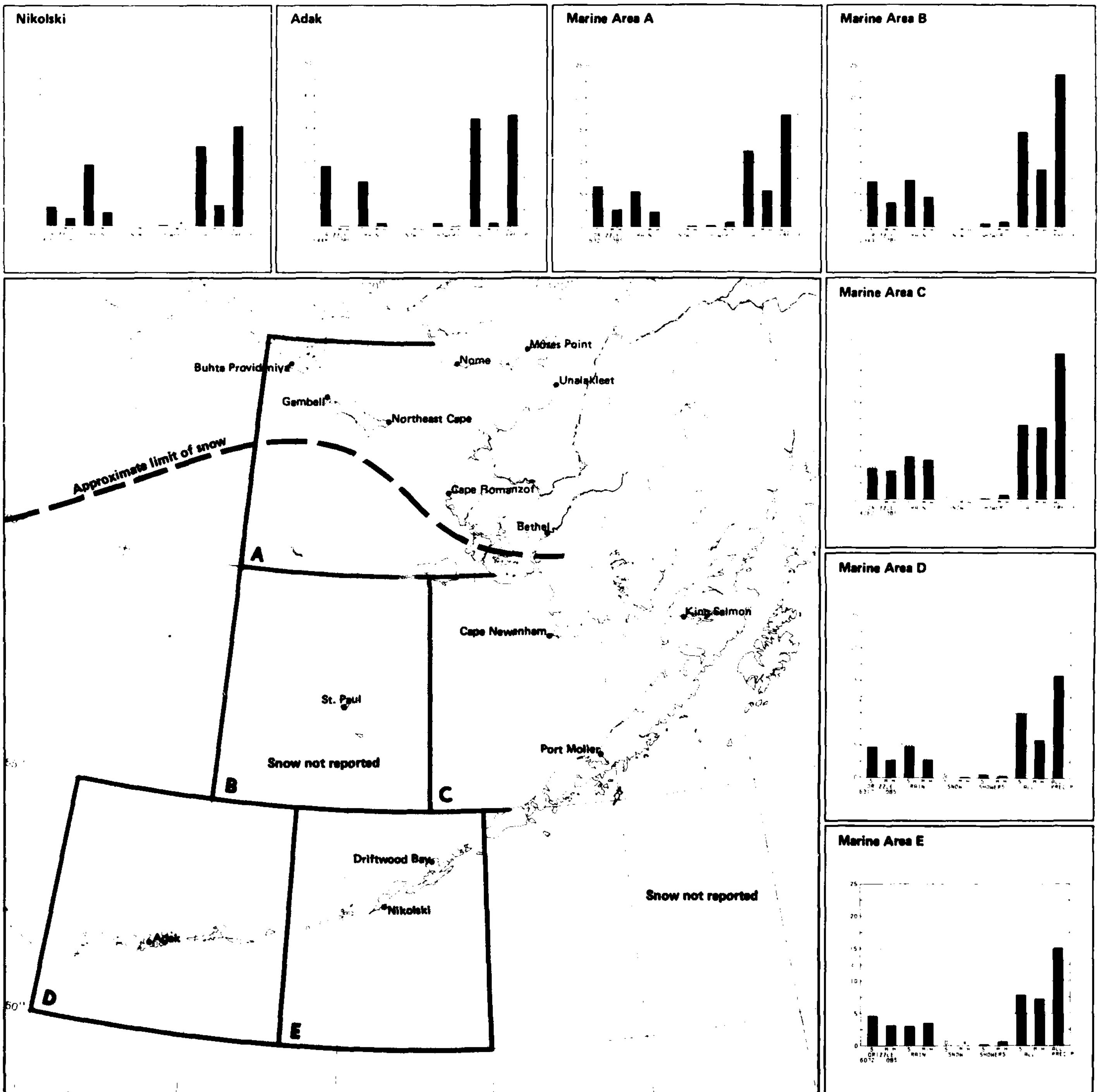


Port Moller



Driftwood Bay

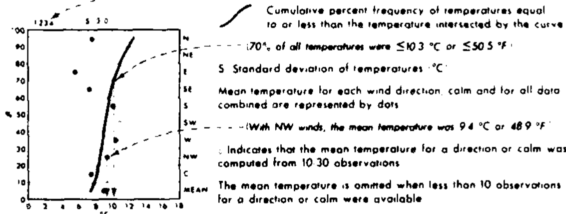




2 Snow **August**

Legend

Air temperature/wind direction



Map - Air temperature mean and thresholds

BLACK LINE Percent frequency of temperature ≤0°C (≤32°F)

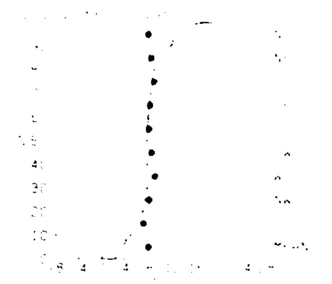
RED LINE Mean air temperature °C

BLUE LINE Percent frequency of wind chill temperature ≤ 30°C (≤ 22°F)

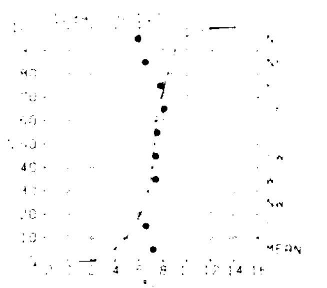
Air temperature readings recorded on transient ships in warm, sunny weather appear biased toward high temperatures, apparently because of improper instrument exposure and ventilation. Despite the inaccuracies, the large scale patterns and mean gradients of the isopleth analyses are relatively accurate.

The temperature scale of the graph may vary in both range and class interval. The percentage of temperature observations greater than a given value can be obtained by subtracting the cumulative percent frequency of that value from 100%. The number of observations and the standard deviation plus the plotted points on the graphs are based on those observations reporting both temperature and wind direction. The cumulative curve is based on all observations reporting temperature with or without wind direction.

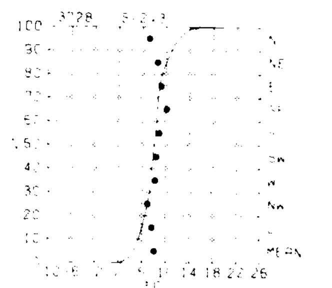
Buhta Provideniya



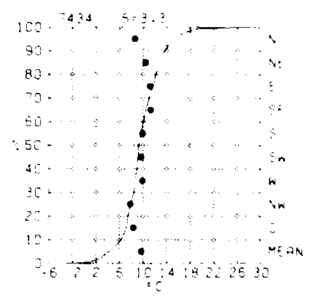
Gambell



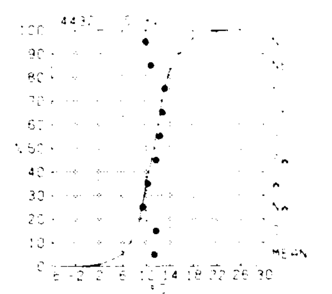
Northeast Cape



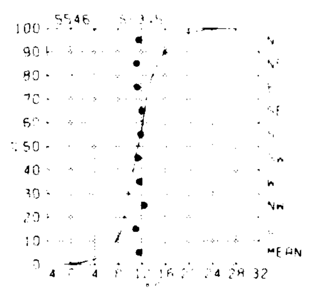
Nome



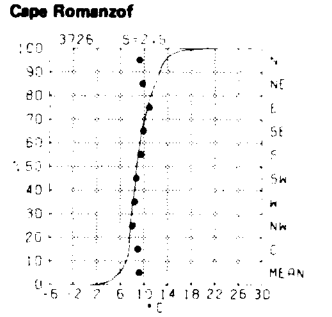
Moses Point



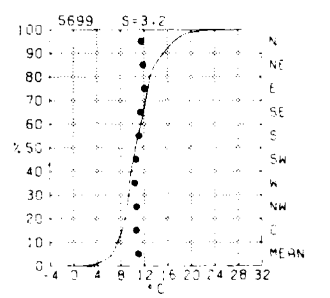
Unalakleet



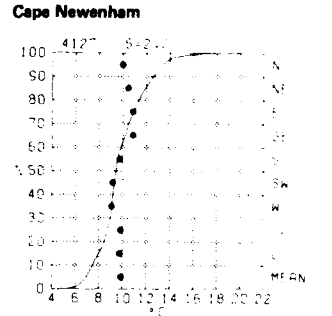
Cape Romanzof



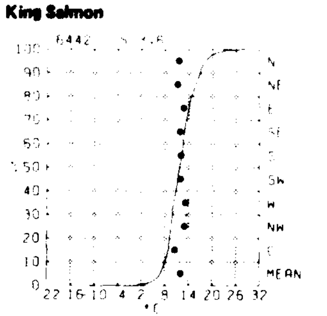
Bethel



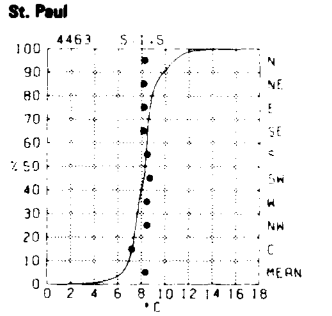
Cape Newenham



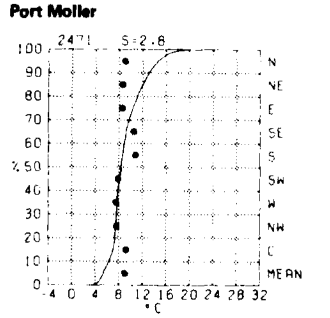
King Salmon



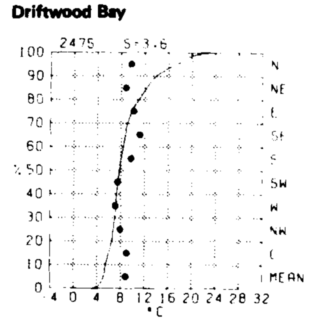
St. Paul



Port Moller

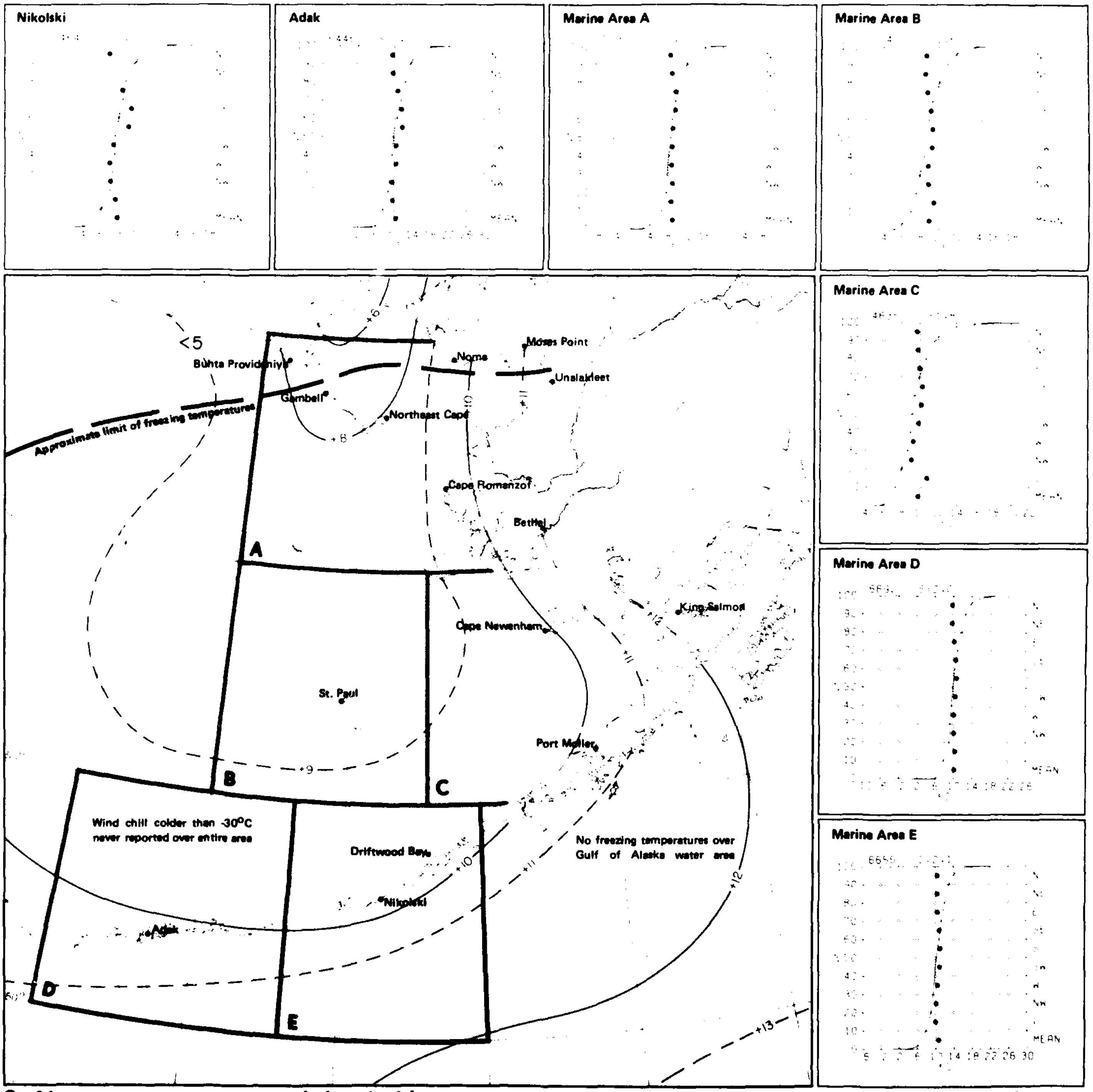


Driftwood Bay



August

3 Air temperature/wind direction

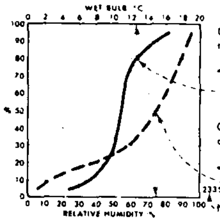


3 Air temperature mean and thresholds

August

Legend

Wet bulb/relative humidity



Cumulative percent frequency of wet bulb temperatures equal to or less than the temperature intersected by the curve (top scale)

Wet bulb (°C)

80% of all observed wet bulb temperatures were ≤12.5°C or 54.5°F)

Cumulative percent frequency of relative humidities equal to or less than the humidity intersected by the curve (bottom scale)

Relative humidity (%)

(50% of all observed relative humidities were ≤74%)

Number of observations

Map - Mean dew point temperature

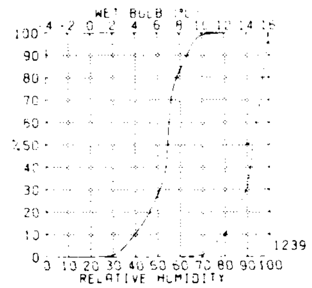
BLACK LINE Mean dew point temperature (°C)

The observation count of the graph reflects those observations reporting both air and wet bulb temperatures, both are required in computing the relative humidity. The percentage of observations of either element greater than a given value can be obtained by subtracting the cumulative percent frequency of that value from 100%.

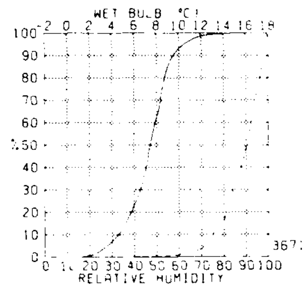
Buhta Provideniya

Insufficient Data

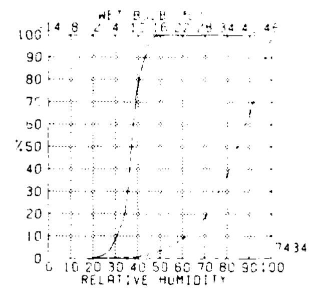
Gambell



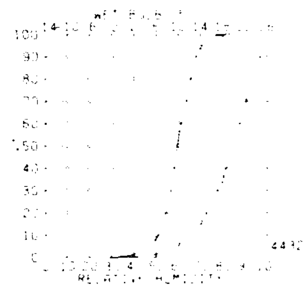
Northeast Cape



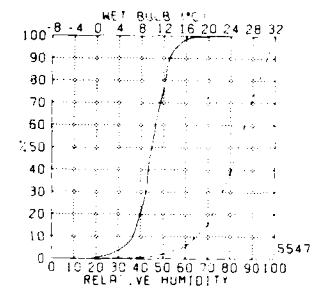
Nome



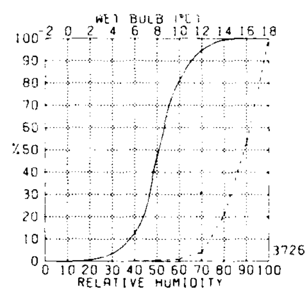
Moses Point



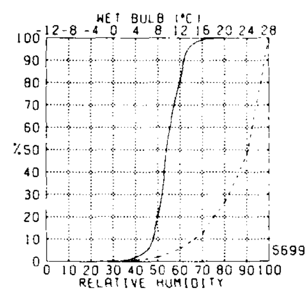
Unalakleet



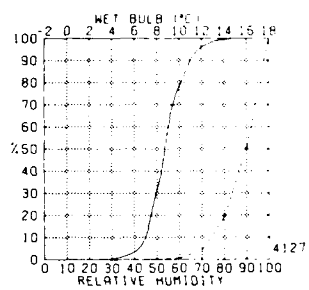
Cape Romanzof



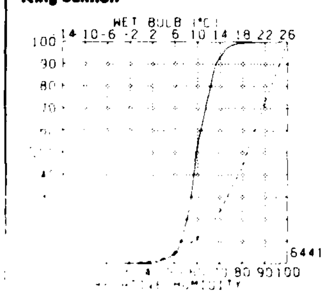
Bethel



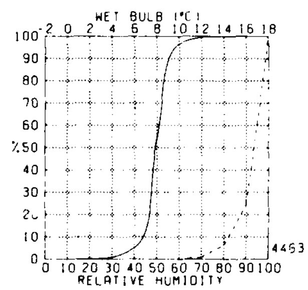
Cape Newenham



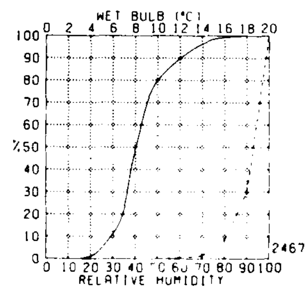
King Salmon



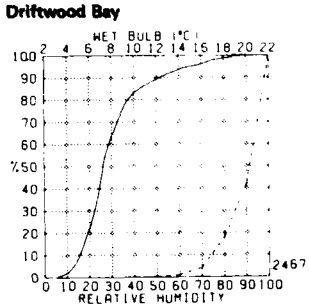
St. Paul

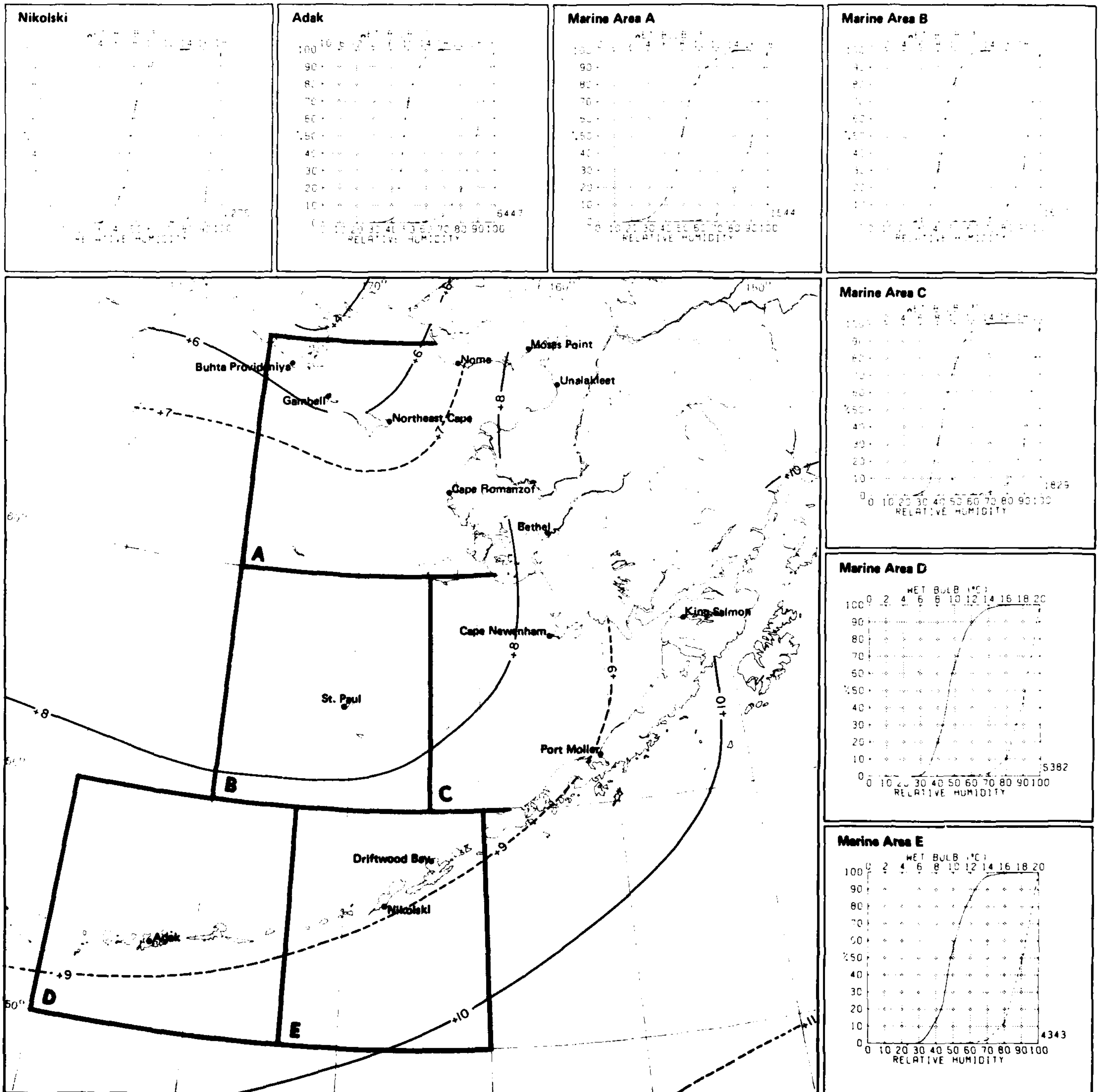


Port Moller



Driftwood Bay





4 Mean dew point temperature

August

Legend

Air temperature/wind speed

WIND SPEED (kts)

Temp °C	0-3	4-10	11-21	22-33	≥34
4.5	18	8	7	1	1
2.3	17	8	7	1	1
0.1	13	6	5	1	1
-2.-1	1	+	0	0	0
-4.-3	0	0	0	0	0
-6.-5	+	0	0	+	+
-8.-7	1	+	0	0	0
-10.-9	0	0	0	0	0
-12.-11	1	+	0	0	0
-14.-13	1	0	0	0	0
-16.-15	1	+	0	0	0

3550

Percent frequency of simultaneous occurrence of specified temperature (°C) and wind speed (knots)

(1% of all observations reported temperature 2-3°C simultaneously with wind speed of 22-33 kts.)

+ Indicates < 5% but >0

Number of observations

Map - Air temperature extremes (°C)

BLACK LINE Maximum (99%) air temperature (1% of temperatures were greater than the given value)

BLUE LINE Minimum (1%) air temperature (1% of temperatures were equal to or less than the given value)

The graph can be used to determine the extent of human discomfort from the combined effects of extreme heat or cold and winds or to estimate the likelihood of superstructure icing. Icing potential increases as the air temperature drops below freezing and the winds increase above 10 knots (12 mph) and may become quite severe with temperatures equal to or less than -9°C (16°F) and winds equal to or greater than 34 knots (39 mph)

Buhta Provideniya

Gambell

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
14.15	0	0	+	0	0
12.13	+	+	+	+	0
10.11	+	2	2	+	0
8.9	2	14	19	1	0
6.7	3	[illegible]	21	4	0
4.5	1	3	4	2	0
2.3	+	+	1	1	0
0.1	0	+	0	0	0
-2.-1	0	+	0	0	0
-4.-3	0	+	0	0	0
-6.-5	0	0	0	0	0

1239

Northeast Cape

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
18.19	+	0	+	0	0
16.17	+	+	+	0	+
14.15	+	+	1	+	0
12.13	+	2	3	+	+
10.11	2	7	6	1	+
8.9	5	18	15	1	+
6.7	4	12	10	2	+
4.5	1	3	3	+	0
2.3	+	1	+	+	0
0.1	0	0	0	0	0
-2.-1	0	0	0	0	0

3728

Nome

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
26.27	0	+	+	0	0
24.25	0	+	+	0	0
22.23	0	+	+	0	0
20.21	+	+	+	0	0
18.19	+	1	+	0	0
16.17	+	2	2	+	0
14.15	1	4	2	+	0
12.13	1	9	6	+	0
10.11	2	12	8	+	+
8.9	3	16	11	1	+
≤7	4	11	5	+	0

7434

Moses Point

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
26.27	0	+	+	0	0
24.25	+	+	+	0	0
22.23	+	+	+	0	0
20.21	+	1	+	0	0
18.19	1	2	1	0	0
16.17	1	4	2	+	0
14.15	1	5	4	+	0
12.13	2	11	12	2	+
10.11	2	10	10	3	+
8.9	2	7	5	1	+
≤7	2	6	2	+	+

4432

Unalakleet

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
28.29	0	0	+	0	0
26.27	0	+	+	0	0
24.25	+	+	+	0	0
22.23	+	+	+	0	0
20.21	+	+	+	0	0
18.19	+	2	1	0	0
16.17	1	5	2	+	0
14.15	1	7	4	+	0
12.13	4	14	8	1	+
10.11	2	11	8	1	+
≤9	4	14	6	1	0

5546

Cape Romanzof

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
20.21	0	+	+	0	0
18.19	0	+	+	+	0
16.17	+	1	1	0	0
14.15	+	2	1	0	0
12.13	2	7	4	+	0
10.11	3	11	7	+	0
8.9	5	17	14	1	0
6.7	3	10	6	1	+
4.5	+	1	1	+	+
2.3	+	+	+	+	0
0.1	+	0	0	0	0

3726

Bethel

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
26.27	0	+		0	0
24.25	+	+	+	0	0
22.23	+	+	+	0	0
20.21	+	1	+	0	0
18.19	+	2	1	0	0
16.17	+	4	1	0	0
14.15	1	5	2	+	0
12.13	2	13	8	+	0
10.11	1	14	9	1	0
8.9	2	13	8	1	+
≤7	1	6	2	+	0

5699

Cape Newenham

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
18.19	0	+	+	+	0
16.17	0	+	+	+	0
14.15	1	1	1	+	0
12.13	3	7	6	+	0
10.11	6	13	9	1	0
8.9	6	20	14	1	+
6.7	2	4	3	+	0
4.5	+	+	+	0	0
2.3	0	0	0	0	0
0.1	0	0	0	0	0
-2.-1	0	0	0	0	0

4127

King Salmon

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
28.29	0	+	+	0	0
26.27	0	+	+	0	0
24.25	+	+	+	0	0
22.23	+	+	+	0	0
20.21	+	1	1	+	0
18.19	+	2	2	+	0
16.17	1	5	4	1	0
14.15	1	7	4	+	0
12.13	3	13	8	1	+
10.11	3	12	6	+	0
≤9	5	14	5	+	0

6442

St. Paul

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
16.17	0	0	+	0	0
14.15	+	+	+	0	0
12.13	0	1	1	+	0
10.11	+	5	9	1	0
8.9	1	21	31	4	+
6.7	1	10	10	1	0
4.5	+	1	+	+	0
2.3	+	+	0	0	0
0.1	+	0	0	0	0
-2.-1	0	0	0	0	0
-4.-3	0	0	0	0	0

4463

Port Moller

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
22.23	0	0	+	0	0
20.21	0	+	+	+	0
18.19	+	+	+	+	0
16.17	+	1	1	+	0
14.15	1	1	2	+	0
12.13	3	4	3	1	0
10.11	4	7	4	1	0
8.9	7	16	10	1	0
6.7	5	17	6	+	0
4.5	1	2	1	0	0
2.3	+	+	+	0	0

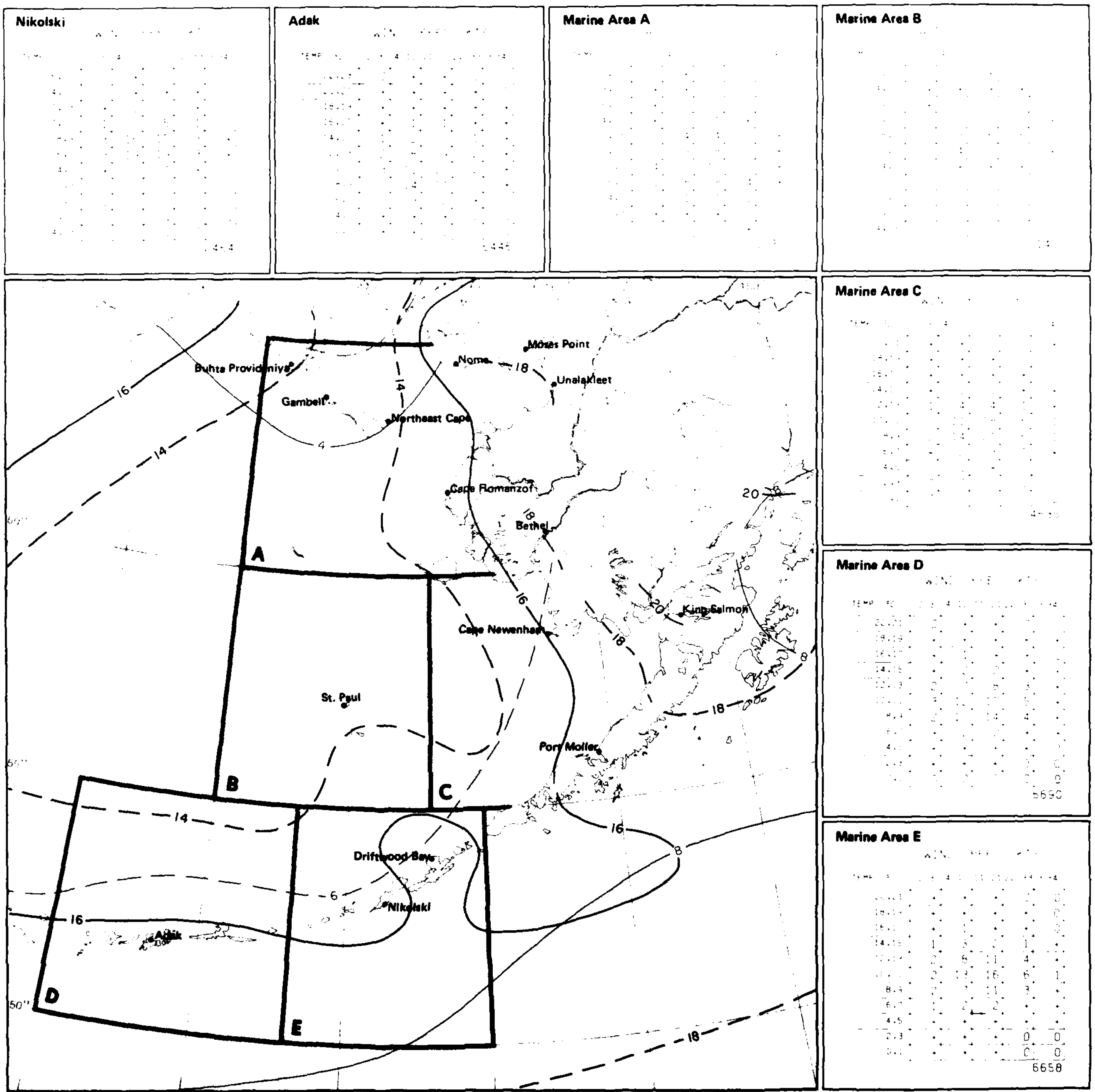
2471

Driftwood Bay

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
24.25	0	0	+	0	0
22.23	+	+	+	0	0
20.21	+	1	1	0	0
18.19	1	1	1	0	0
16.17	1	1	+	0	0
14.15	1	1	1	+	0
12.13	2	3	2	+	0
10.11	4	4	2	+	0
8.9	9	12	4	+	0
6.7	11	23	6	0	0
≤5	2	4	1	0	0

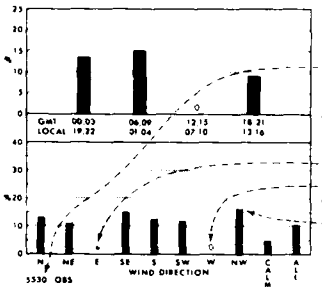
2475



5 Air temperature extremes (°C) **August**

Legend

Fog/time and fog/wind direction



Number of observations

Bar graphs represent percent frequency of Fog (without precipitation) for various hour groupings and wind directions. Data are based on 100% for each hour group and direction category

* indicates < 05% but >0

0 indicates no fog occurred with the wind direction

(Data show that 17% of all NW winds were accompanied by Fog (without precipitation).)

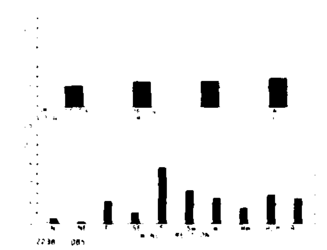
Map · Fog

BLACK LINE · Percent frequency of occurrence of all fog

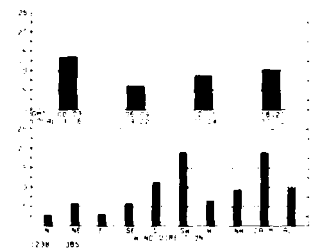
BLUE LINE · Percent frequency of fog occurring without precipitation

The percent frequency of observations reporting fog with precipitation for a given point can be determined by computing the difference between the two analyses

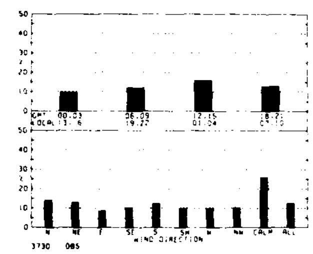
Buhta Provideniya



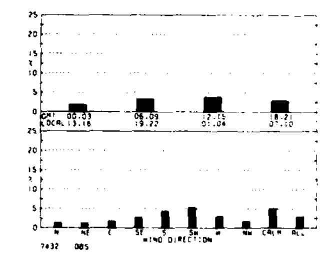
Gambell



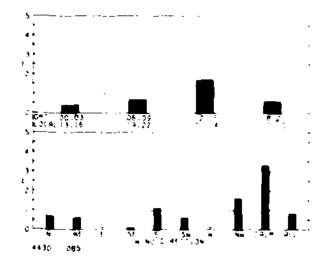
Northeast Cape



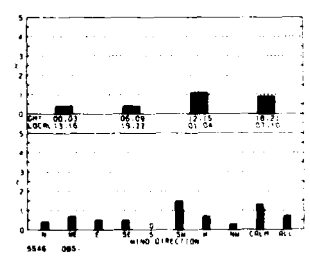
Nome



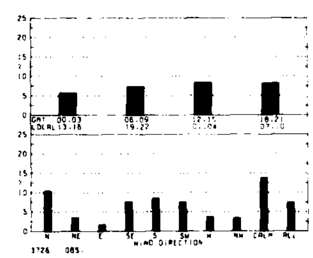
Moses Point



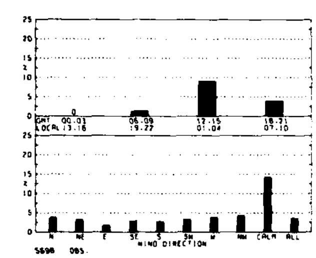
Unalakleet



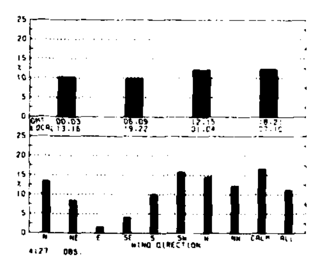
Cape Romanzof



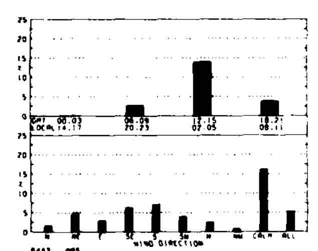
Bethel



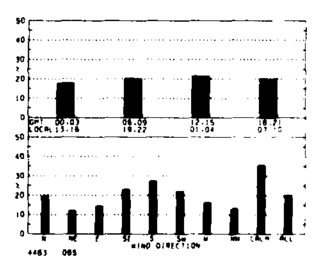
Cape Newenham



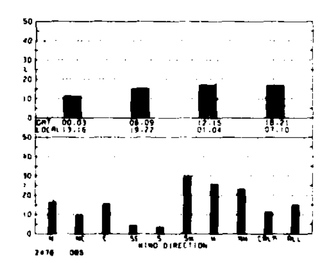
King Salmon



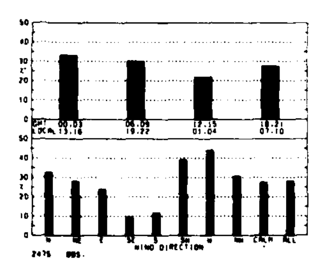
St. Paul



Port Moller



Driftwood Bay



August

6 Fog/time and fog/wind direction

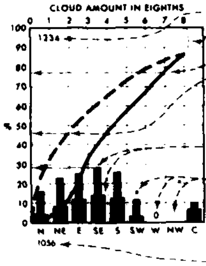

Nikolski
Adak
Marine Area A
Marine Area B
Marine Area C
Marine Area D
Marine Area E
Buhta Providéniya
Gambell
Nome
Moses Point
Unalakleet
Northeast Cape
Cape Romanzof
Bethel
King Salmon
Cape Newenham
St. Paul
Port Moller
Driftwood Bay
Nikolski
Adak
A
B
C
D
E
WIND DIRECTION

6 Fog

August

Legend

Cloud cover/wind direction



Total Cloud Amount; Low Cloud Amount: Cumulative percent frequency of indicated cloud amount equal to or less than the amount intersected by the curve

Number of total cloud observations

Obscurations

(77% of all total cloud amounts were ≤7/8.)

(46% of all low cloud amounts were ≤2/8.)

Low cloud amount. Percent frequency of observations from each direction and calm that were accompanied by low cloud amounts ≥5/8 and ≥7/8. Low clouds are clouds with bases <8000 feet

(28% of all SE winds were accompanied by low cloud amounts ≥5/8 and 14% by low cloud amounts ≥7/8.)

An asterisk indicates that the percentage is based on 10-30 observations of wind direction, total and low cloud amount. 0 replaces bar graph when no low cloud amounts ≥5/8 were observed with a wind direction or calm. 0 or bar is omitted when number of observations of total and low cloud amount from a wind direction or calm is less than 10

Number of low cloud observations

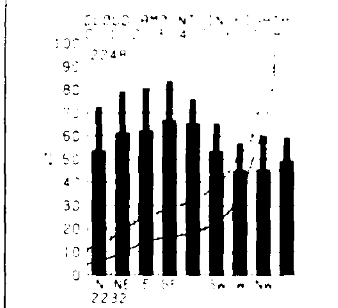
Map - Cloud amount thresholds

BLACK LINE Percent frequency of total cloud amount ≤2/8

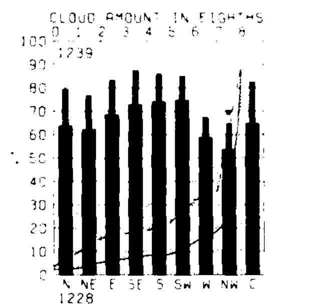
BLUE LINE Percent frequency of low cloud amount ≥5/8

Since the number of observations reporting low cloud amount is usually less than that for total cloud amount, somewhat different samples may be used to compute the two curves on the graph. This may lead to inconsistencies where low cloud amount appears higher than the total cloud amount. Where this occurred the graph was adjusted in favor of the total cloud by making the curves coincide. The frequency of obscured conditions may be determined by subtracting the cumulative percent frequency corresponding to 8/8 coverage from 100%. In computing the bar graph, obscurations are considered as 8/8 coverage.

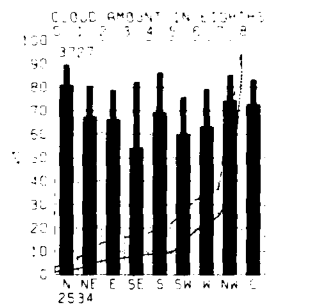
Buhta Provideniya



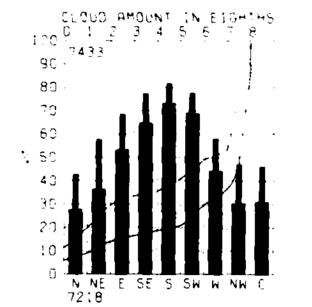
Gambell



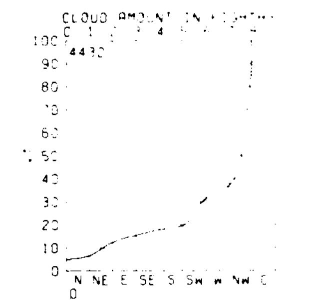
Northeast Cape



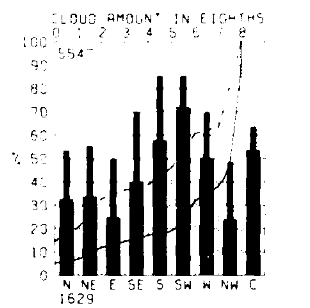
Nome



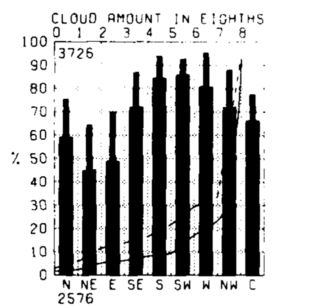
Moses Point



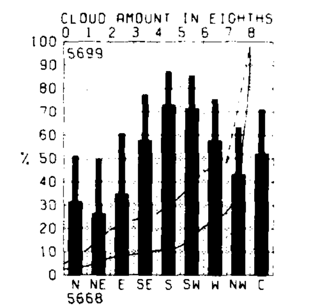
Unalakleet



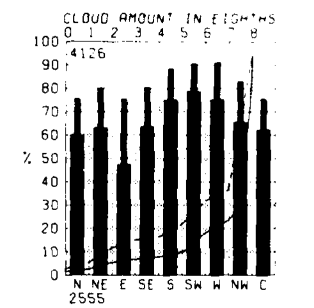
Cape Romanzof



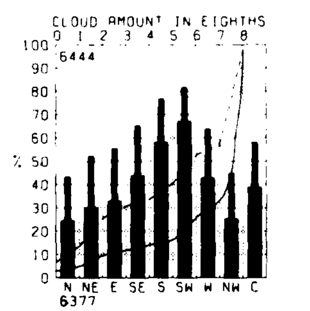
Bethel



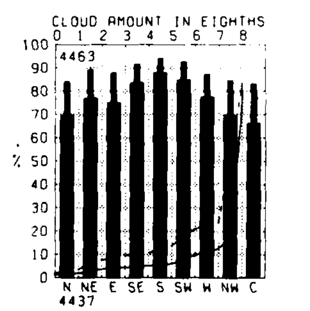
Cape Newenham



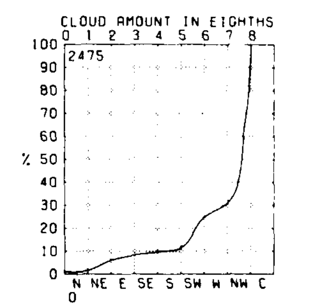
King Salmon



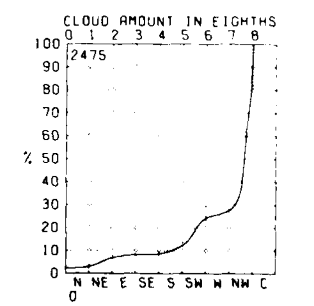
St. Paul

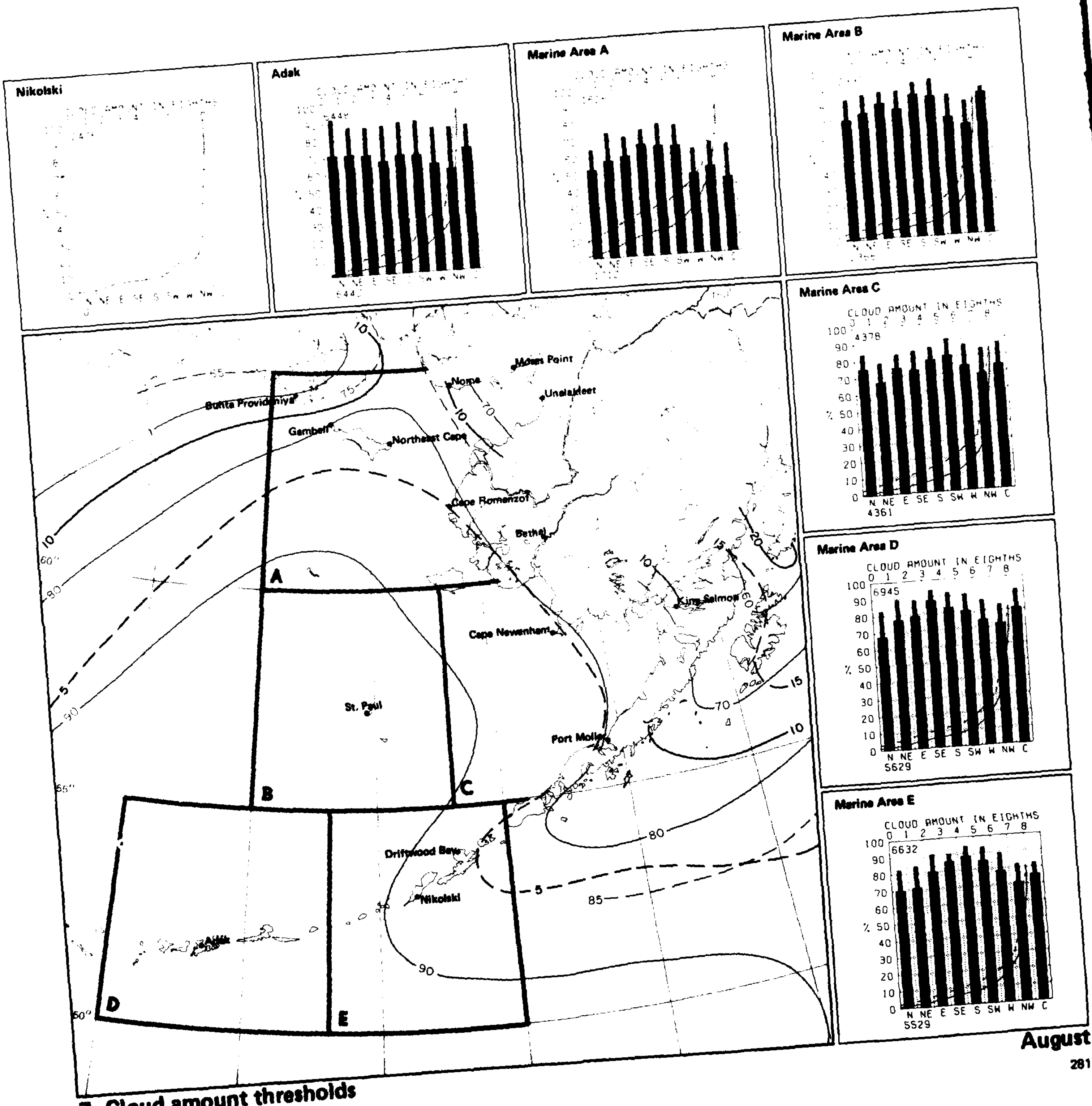


Port Moller



Driftwood Bay



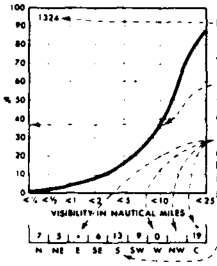


7 Cloud amount thresholds

August

Legend

Visibility/wind direction



Number of observations

Cumulative percent frequency of visibilities less than the visibility intersected by the curve

(37% of all visibilities reported were <10 nautical miles.)

The table below the graph indicates percent frequency of occurrence of visibility <2 nautical miles versus wind direction

• indicates < 5% but >0 0 indicates that no visibilities <2 nautical miles were observed with winds from a direction or calm No percentage is given if less than 10 observations were available for visibility and wind direction An asterisk indicates that the percentage was based on 10-30 observations of visibility and wind direction

(13% of all S winds were accompanied by visibilities <2 nautical miles.)

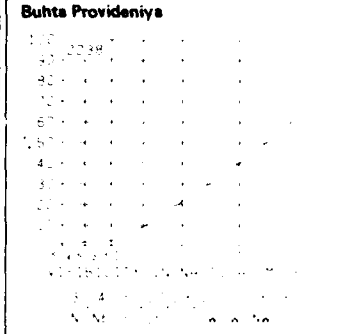
Map · Visibility thresholds

BLACK LINE Percent frequency of visibilities ≥5 nautical miles

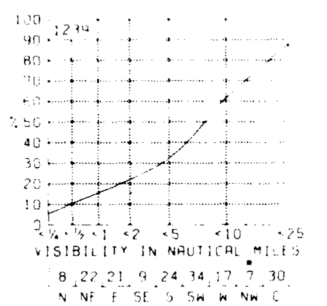
BLUE LINE Percent frequency of visibilities <2 nautical miles

The percentage of visibility equal to or greater than a given value can be obtained from the graph by subtracting the cumulative percent frequency of that value from 100%. Visibility at sea is difficult to measure because of the lack of reference points. Also, some observers seem to report reduced visibilities at night because of darkness though this tendency has abated in recent years. The coarseness of the coding intervals, however, tends to minimize serious biases in the summarized data. Visibilities greater than 25 nmi should be interpreted cautiously because the earth's curvature makes it impossible to see 25 nmi horizontally from the bridges of most ships.

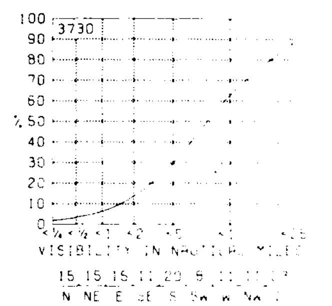
Buhta Provideniya



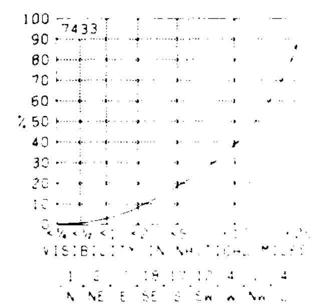
Gambell



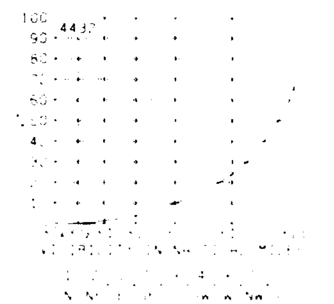
Northeast Cape



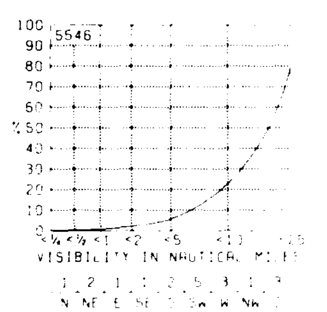
Nome



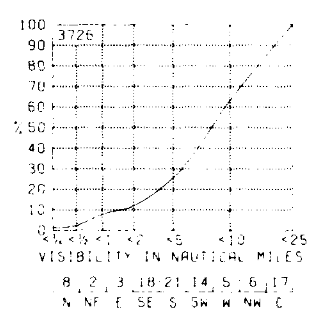
Moses Point



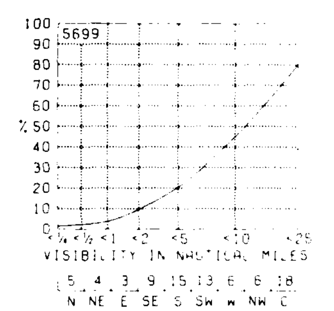
Unalakleet



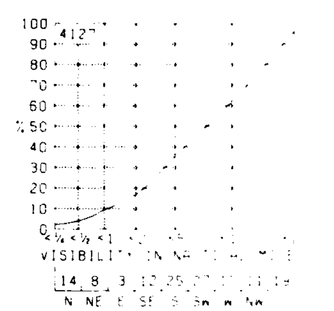
Cape Romanzof



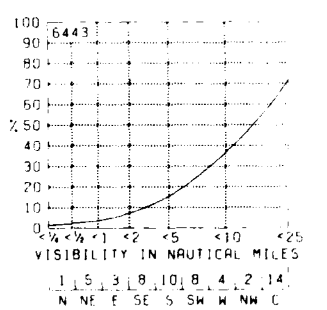
Bethel



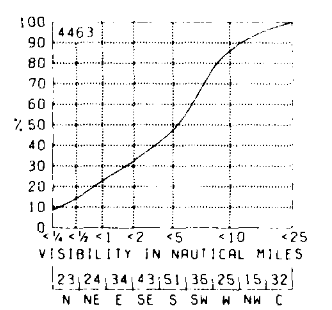
Cape Newenham



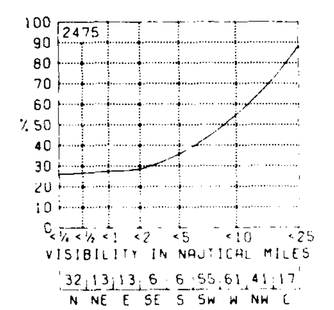
King Salmon



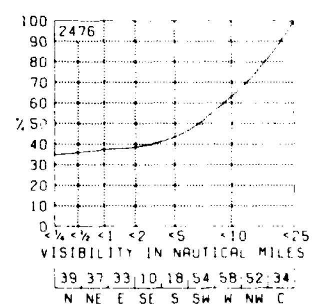
St. Paul

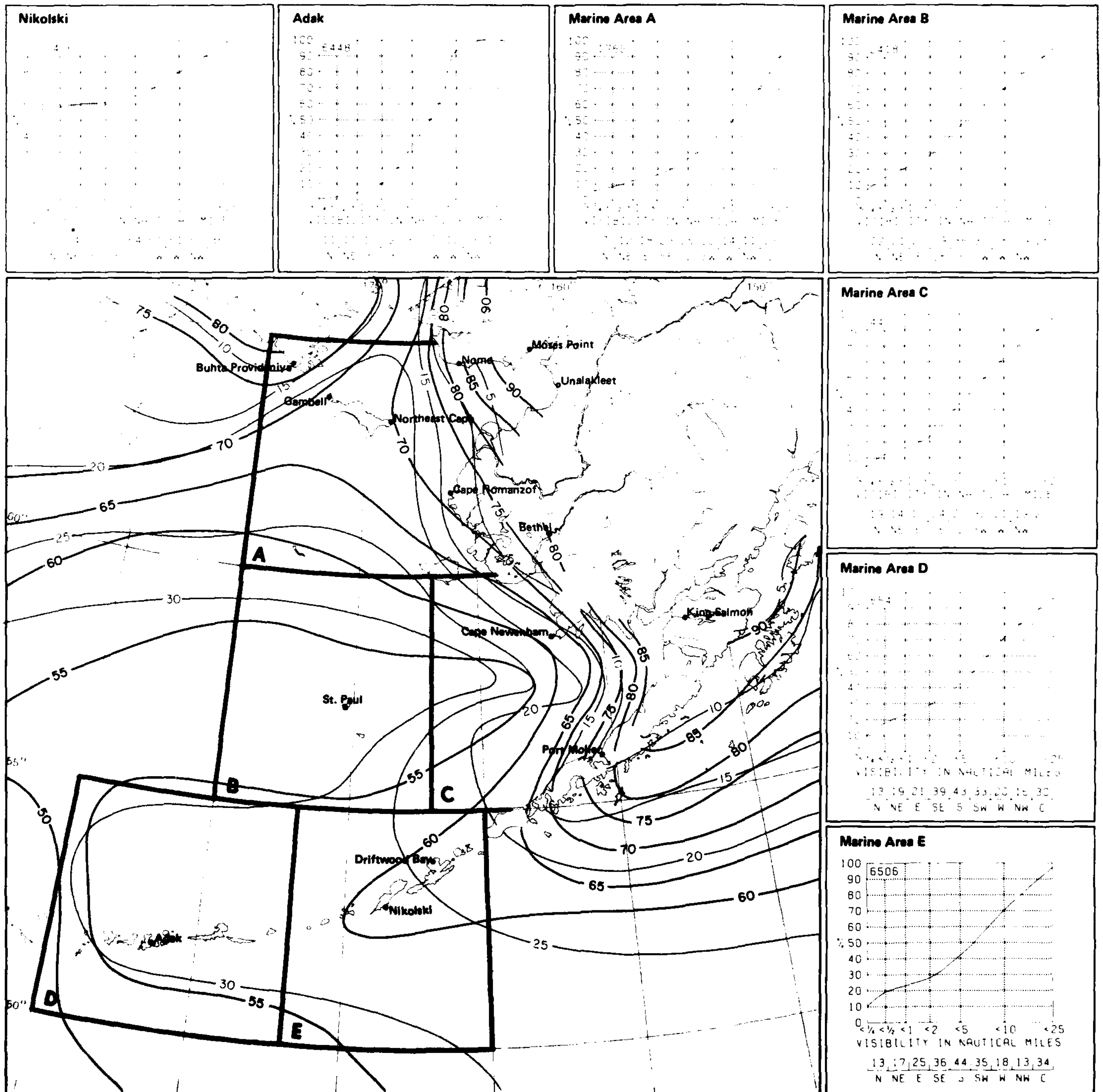


Port Moller



Driftwood Bay





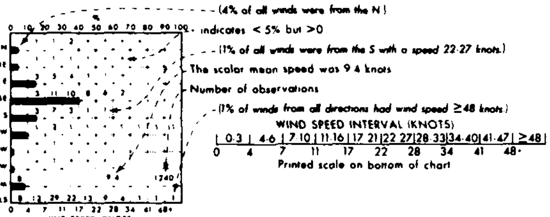
8 Visibility thresholds

August

Legend

Wind speed/direction

Direction frequency (top scale). Bars represent percent frequency of winds observed from each direction. Speed frequency (bottom scale). Printed figures represent percent frequency of wind speeds observed from each direction.



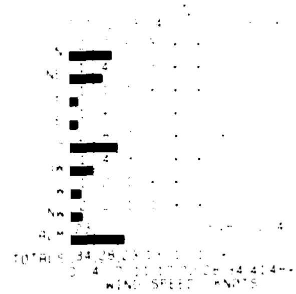
Map - Wind speed thresholds

BLACK LINE Percent frequency of wind speed ≤10 knots (≤12 mph)

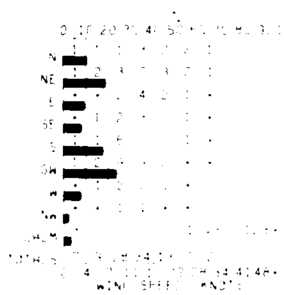
BLUE LINE Percent frequency of wind speed ≥34 knots (≥39 mph)

The scalar mean wind speed on the graph is based on the number of observations reporting a wind speed with direction. The sum of the totals line provides the cumulative percent frequency of wind speed below a selected threshold value. In the example graph, 71% of all winds were less than 17 knots (20 mph).

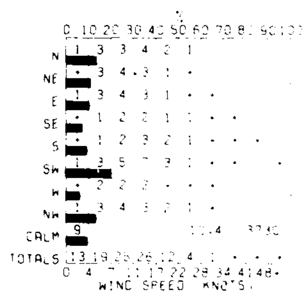
Buhta Provideniya



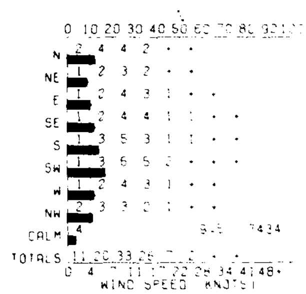
Gambell



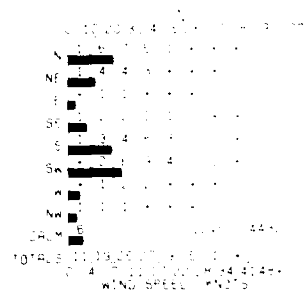
Northeast Cape



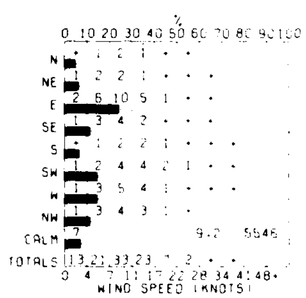
Nome



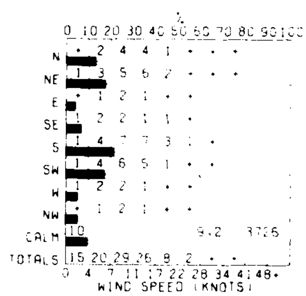
Moses Point



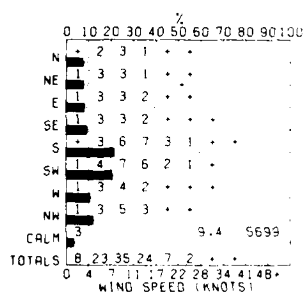
Unalakleet



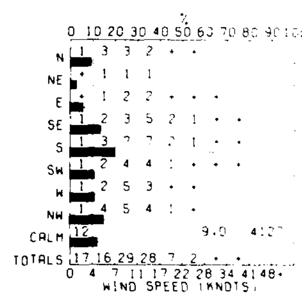
Cape Romanzof



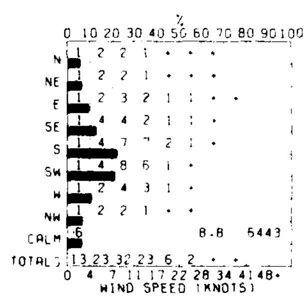
Bethel



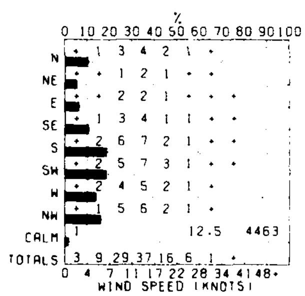
Cape Newenham



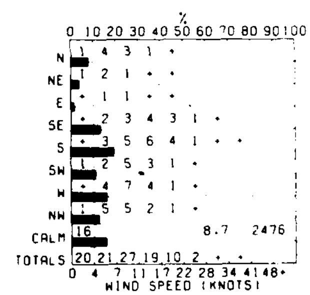
King Salmon



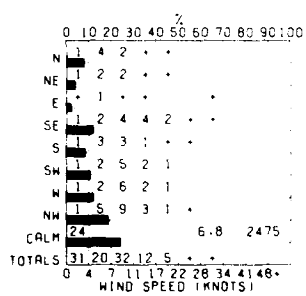
St. Paul

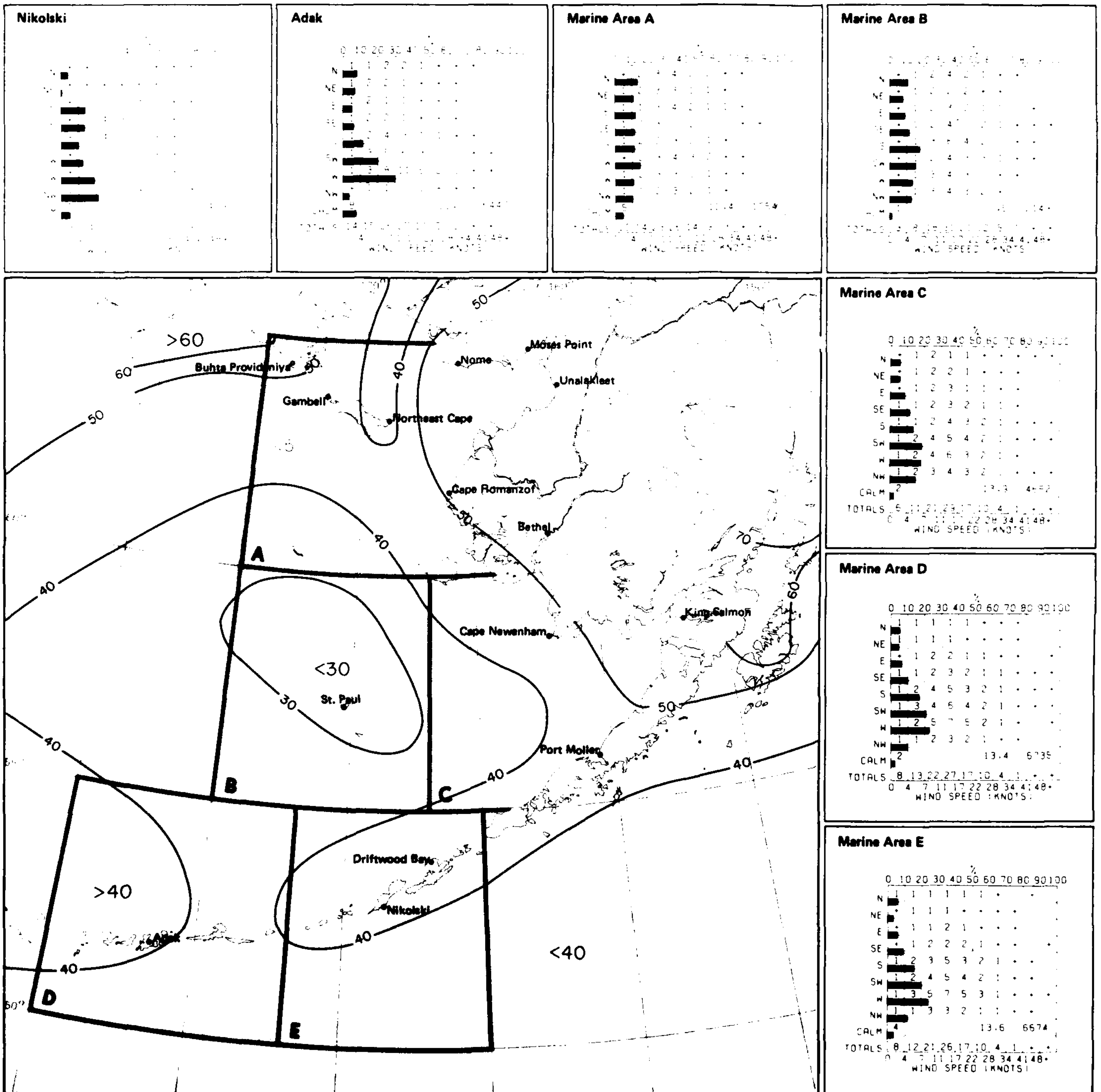


Port Moller



Driftwood Bay

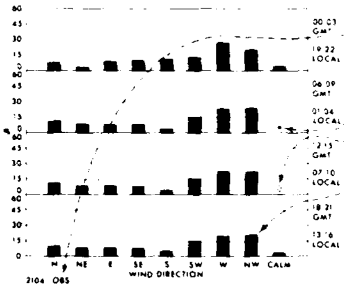




9 Wind speed thresholds

August

Legend | **Wind direction/diurnal variation**



Number of observations

Bars show percent frequency of wind direction 8 pts by hour GMT and Local Time. Data are based on 100% for each hour group

* indicates < 05% but > 0

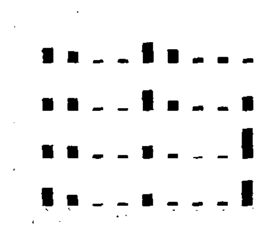
0 indicates no observations in the category

22% of the wind observations for the hours 18 and 21 GMT 13 and 16 Local Time had a direction from the northwest

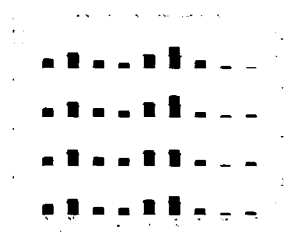
Map · Vector mean wind

10.2 Direction of flow toward station dot vector magnitude in knots example vector mean wind is from northeast at 10.2 knots or 11.7 mph

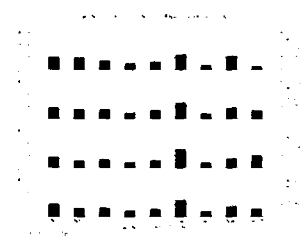
Buhta Provideniya



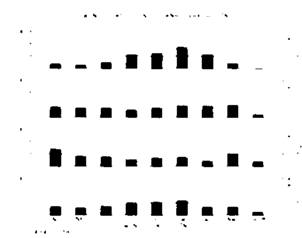
Gambell



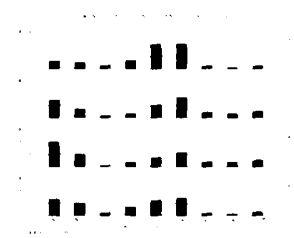
Northeast Cape



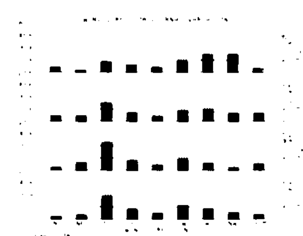
Nome



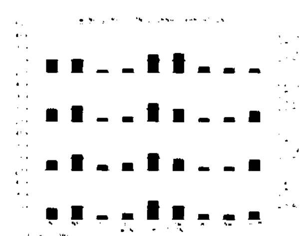
Moses Point



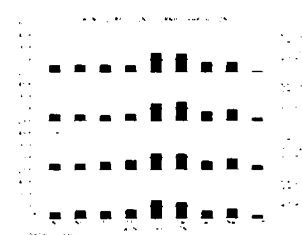
Unalakleet



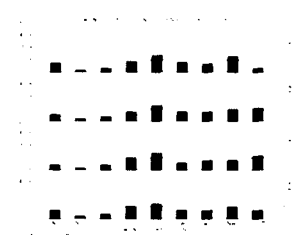
Cape Romanzof



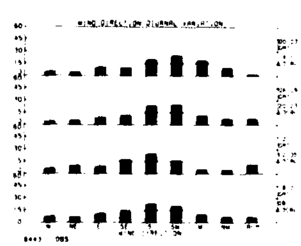
Bethel



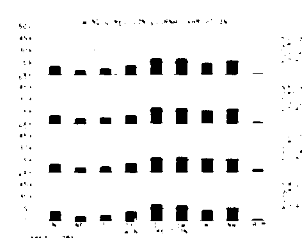
Cape Newenham



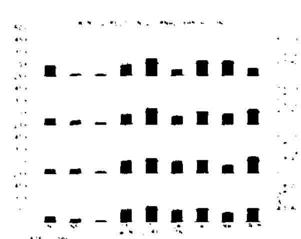
King Salmon



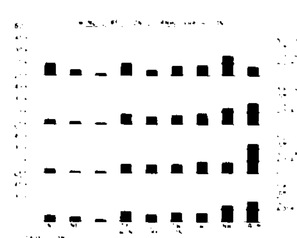
St. Paul

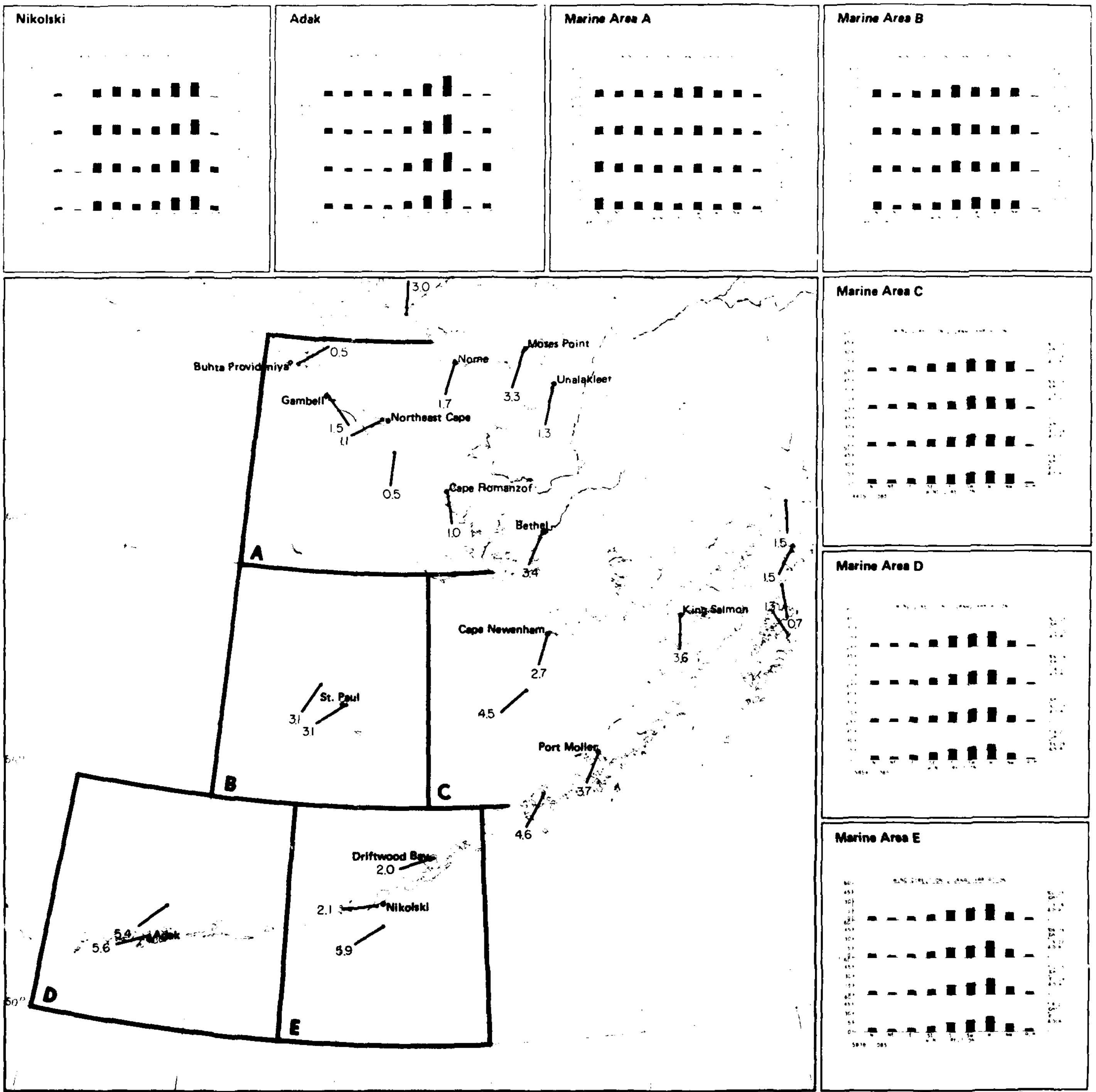


Port Moller



Driftwood Bay





10 Vector mean wind

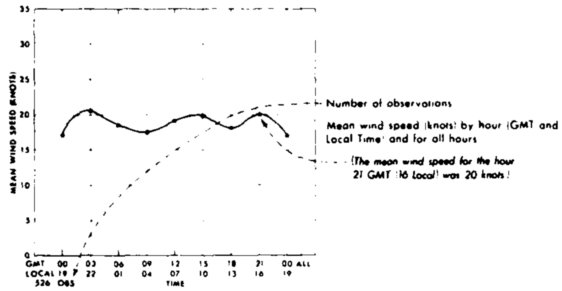
August

AD-A081 311 ALASKA UNIV ANCHORAGE ARCTIC ENVIRONMENTAL INFORMATI--ETC F/G 4/2
CLIMATIC ATLAS OF THE OUTER CONTINENTAL SHELF WATERS AND COASTA--ETC(U)
1977 W A BROWER, H F DIAZ, A S PRECHTEL

UNCLASSIFIED AEIDC-B-77-VOL-2 NL

4 of 5

Legend Wind speed/diurnal variation

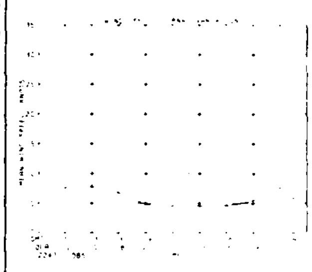


Map - Scalar mean wind

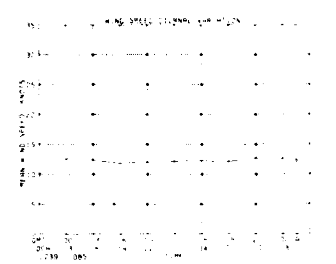
BLACK LINE Scalar mean wind (knots).

In areas of high persistence of direction, the magnitude of the vector mean winds should closely approach that of the scalar mean winds. As most of the marine observations are recorded at six hour intervals, disregard the plots for other than 00, 06, 12, 18, GMT hours on the marine area graphs.

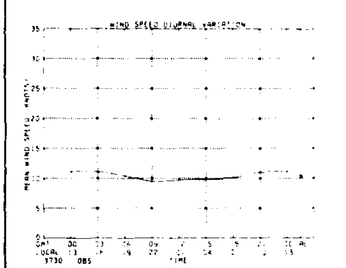
Buhta Provideniya



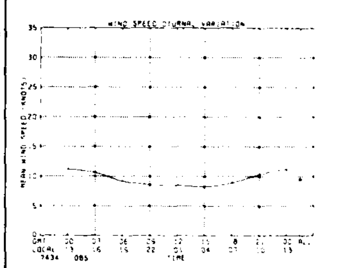
Gambell



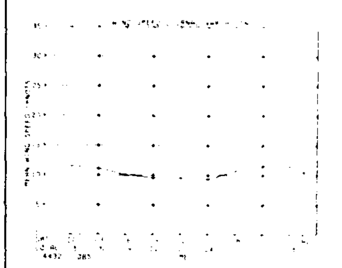
Northeast Cape



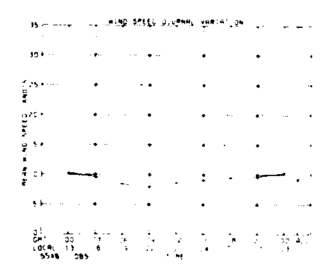
Nome



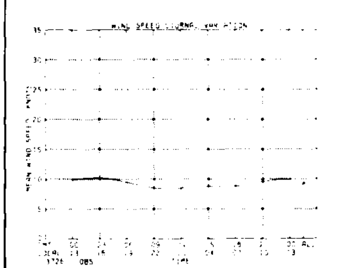
Moses Point



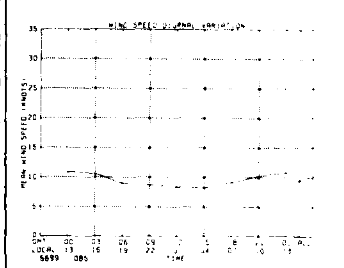
Unalakleet



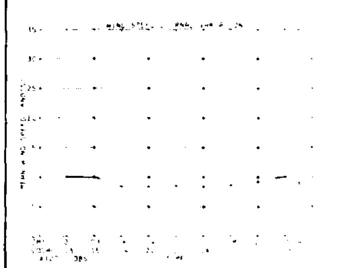
Cape Romanzof



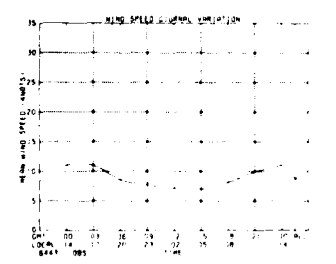
Bethel



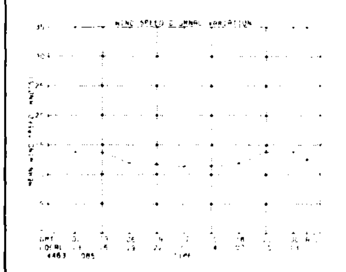
Cape Newenham



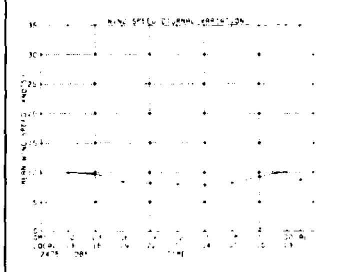
King Salmon



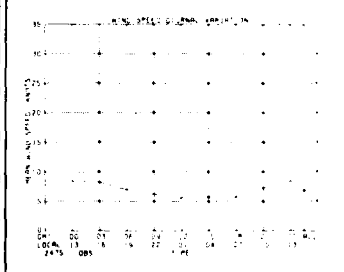
St. Paul

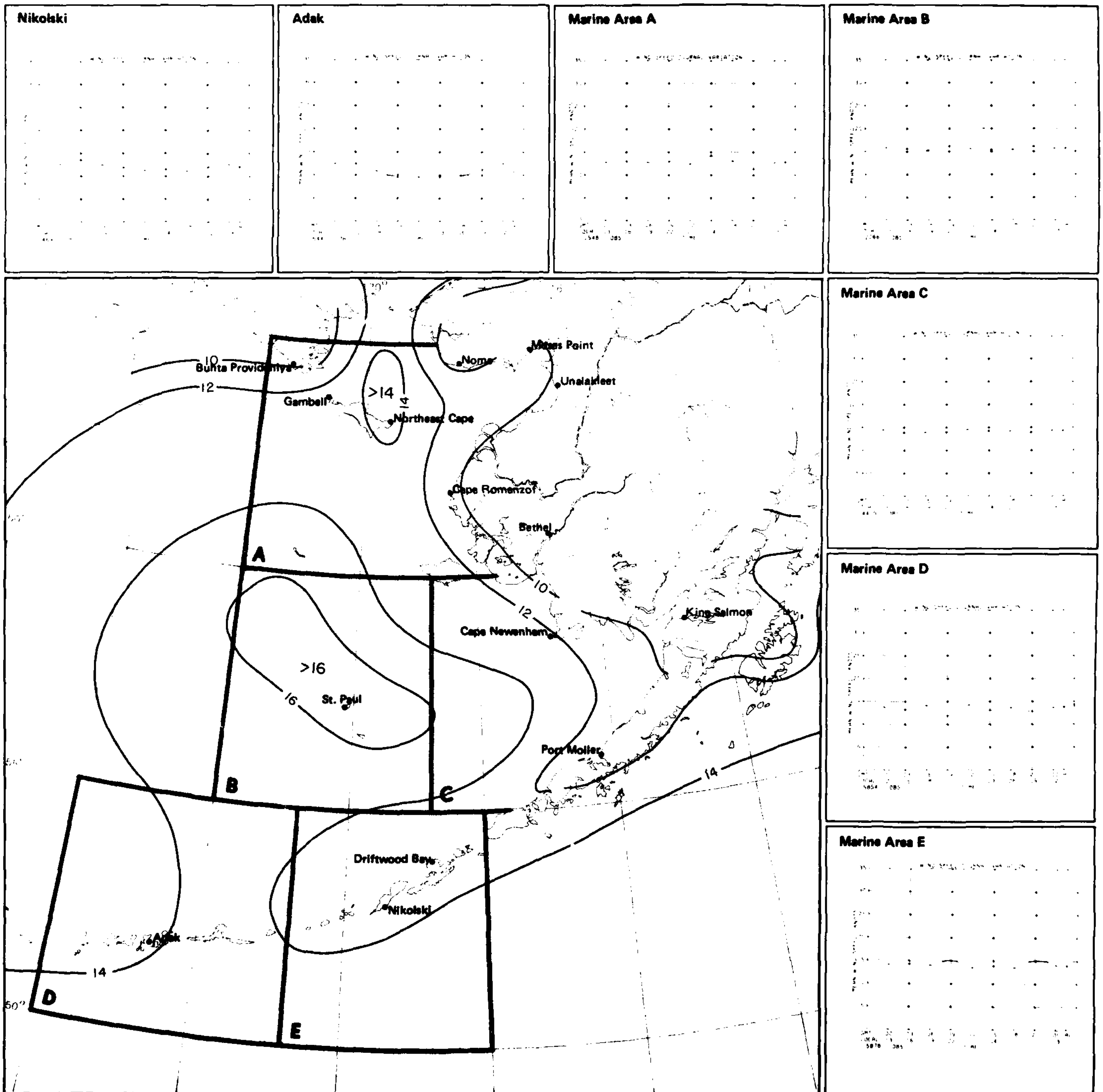


Port Moller



Driftwood Bay





11 Scalar mean wind **August**

Legend

Low cloud ceiling/visibility

VISIBILITY

LOW CLOUD CEILING	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	0	0	+	3	13	64
50<80	0	0	0	0	+	1
35<50	0	+	0	0	0	4
20<35	0	+	1	1	2	2
10<20	0	+	1	1	2	1
6<10	0	1	0	+	+	0
3<6	+	+	0	+	+	0
1.5<3	+	0	0	0	0	0
0<1.5	+	0	0	0	0	0

334

Percent frequency of simultaneous occurrence of specified low cloud ceilings (hundreds of feet) and visibilities (nautical miles)

Low cloud ceiling heights are estimated from the height of low clouds (h) when low cloud amount (N_h) is ≥5/8

Obscurations are included under ceiling 0 <1.5

"N C" (no ceiling) includes bases of clouds ≥8000 feet as well as occurrences of N_h <5/8

(2% of all observations reported ceiling ≥1000 but <2000 feet simultaneously with visibility ≥5 but <10 nautical miles)

+ indicates < 5% but >0

Number of observations

Map - Low cloud ceiling and visibility thresholds

BLACK LINE Percent frequency of low cloud ceiling ≥1000 feet (or no low cloud ceiling) and visibility ≥5 nautical miles

BLUE LINE Percent frequency of low cloud ceiling <600 feet and/or visibility <2 nautical miles

Buhta Provideniya

VISIBILITY

LOW CLOUD CEILING	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	+	[illegible]	1	1	[illegible]	+
50<80	[illegible]	[illegible]	[illegible]	[illegible]	+	[illegible]
35<50	[illegible]	+	[illegible]	[illegible]	1	[illegible]
20<35	[illegible]	+	+	[illegible]	4	+
10<20	+	[illegible]	+	[illegible]	[illegible]	+
6<10	[illegible]	+	[illegible]	+	1	1
3<6	+	+	1	1	+	+
1.5<3	0	+	1	+	+	+
0<1.5	2	0	+	0	[illegible]	+

2201

Gambell

VISIBILITY

LOW CLOUD CEILING	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	+	+	+	+	3	16
50<80	0	+	0	0	+	1
35<50	0	0	0	0	1	1
20<35	0	0	+	+	1	5
10<20	0	0	0	+	5	7
6<10	0	+	1	5	11	7
3<6	1	1	3	4	8	2
1.5<3	+	1	1	1	0	0
0<1.5	9	2	1	+	+	0

1228

Northeast Cape

VISIBILITY

LOW CLOUD CEILING	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	+	+	+	1	3	14
50<80	+	0	0	+	+	1
35<50	0	0	0	0	+	1
20<35	0	+	+	+	2	6
10<20	0	+	1	4	10	13
6<10	+	1	3	6	10	4
3<6	+	1	3	4	4	1
1.5<3	+	0	+	+	+	+
0<1.5	3	2	1	+	0	0

2534

Nome

VISIBILITY

LOW CLOUD CEILING	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	+	+	+	+	2	36
50<80	+	0	0	0	+	3
35<50	0	0	+	+	+	3
20<35	0	+	0	+	2	7
10<20	+	+	+	1	6	9
6<10	0	+	1	4	7	3
3<6	+	1	3	4	2	1
1.5<3	+	+	+	+	+	+
0<1.5	+	+	+	+	+	0

7217

Moses Point

VISIBILITY

LOW CLOUD CEILING	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	0	0	0	+	+	28
50<80	0	0	0	0	1	9
35<50	0	0	0	0	1	7
20<35	0	0	0	1	5	12
10<20	0	+	0	3	10	10
6<10	0	1	1	3	4	2
3<6	0	+	+	1	+	+
1.5<3	0	0	0	0	0	0
0<1.5	+	+	0	+	0	0

490

Unalakleet

VISIBILITY

LOW CLOUD CEILING	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	+	0	+	+	3	38
50<80	0	[illegible]	0	0	1	4
35<50	0	0	0	0	1	4
20<35	+	1	0	+	4	16
10<20	0	0	+	1	6	13
6<10	+	+	+	1	3	7
3<6	[illegible]	+	+	+	1	+
1.5<3	+	[illegible]	0	0	0	0
0<1.5	+	+	+	+	+	0

1529

Cape Romanzof

VISIBILITY

LOW CLOUD CEILING	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	+	+	+	1	6	10
50<80	0	0	0	0	1	1
35<50	0	0	0	0	1	+
20<35	0	0	+	+	3	3
10<20	0	+	+	2	12	8
6<10	0	+	1	5	13	4
3<6	+	1	2	7	5	1
1.5<3	0	+	+	+	0	+
0<1.5	3	5	2	1	0	+

2576

Bethel

VISIBILITY

LOW CLOUD CEILING	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	1	+	+	1	4	23
50<80	+	+	+	0	1	2
35<50	+	0	+	+	1	4
20<35	+	+	+	+	3	11
10<20	+	+	+	2	7	11
6<10	+	+	2	5	6	4
3<6	+	1	2	3	2	1
1.5<3	+	+	+	+	+	+
0<1.5	1	+	1	+	+	0

5668

Cape Newenham

VISIBILITY

LOW CLOUD CEILING	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	+	+	+	+	6	10
50<80	0	0	0	+	+	+
35<50	0	0	+	0	1	1
20<35	+	0	+	+	3	4
10<20	+	+	+	2	7	10
6<10	+	+	2	9	9	8
3<6	+	1	3	7	4	1
1.5<3	+	+	+	+	+	0
0<1.5	5	3	1	+	+	+

2555

King Salmon

VISIBILITY

LOW CLOUD CEILING	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	1	+	+	1	4	32
50<80	+	+	0	+	1	5
35<50	0	+	0	+	1	6
20<35	+	+	+	+	3	10
10<20	0	0	+	1	5	8
6<10	+	+	1	3	4	2
3<6	0	+	1	3	3	1
1.5<3	0	+	+	+	+	+
0<1.5	1	1	1	+	+	+

6376

St. Paul

VISIBILITY

LOW CLOUD CEILING	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	+	+	+	1	7	4
50<80	+	0	0	+	+	+
35<50	0	0	0	+	+	+
20<35	+	+	0	+	4	2
10<20	+	+	+	1	10	5
6<10	+	+	1	3	9	1
3<6	1	3	6	10	7	1
1.5<3	+	2	1	1	+	+
0<1.5	12	3	1	+	0	+

4437

Port Moller

Insufficient Data

Driftwood Bay

Insufficient Data

Nikolski

Insufficient Data

Adak

VISIBILITY

LOW CLOUD CEILING	<½	½<1	1<2	2<5	5<10	≥10
NC	·	·	·	1	8	4
50<80	·	·	0	0	·	·
35<50	0	0	0	·	1	·
20<35	0	0	·	·	6	1
10<20	·	·	1	5	23	1
6<10	0	·	1	10	14	1
3<6	·	1	2	6	6	·
1.5<3	·	·	·	·	·	0
0<1.5	1	1	1	1	·	0

6440

Marine Area A

VISIBILITY

LOW CLOUD CEILING	<½	½<1	1<2	2<5	5<10	≥10
NC	·	[illegible]	[illegible]	·	[illegible]	[illegible]
50<80	[illegible]	[illegible]	·	[illegible]	·	[illegible]
35<50	·	[illegible]	[illegible]	·	·	[illegible]
20<35	·	·	·	[illegible]	4	[illegible]
10<20	[illegible]	[illegible]	·	[illegible]	·	[illegible]
6<10	·	·	[illegible]	[illegible]	[illegible]	[illegible]
3<6	·	·	·	[illegible]	[illegible]	[illegible]
1.5<3	·	[illegible]	·	·	[illegible]	·
0<1.5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	·

[illegible]

Marine Area B

VISIBILITY

LOW CLOUD CEILING	<½	½<1	1<2	2<5	5<10	≥10
NC	·	·	·	[illegible]	2	[illegible]
50<80	·	[illegible]	[illegible]	·	·	·
35<50	[illegible]	[illegible]	[illegible]	·	[illegible]	[illegible]
20<35	·	·	·	[illegible]	2	6
10<20	·	·	[illegible]	4	[illegible]	[illegible]
6<10	·	[illegible]	[illegible]	8	6	[illegible]
3<6	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1.5<3	·	·	[illegible]	·	·	·
0<1.5	14	[illegible]	[illegible]	[illegible]	·	·

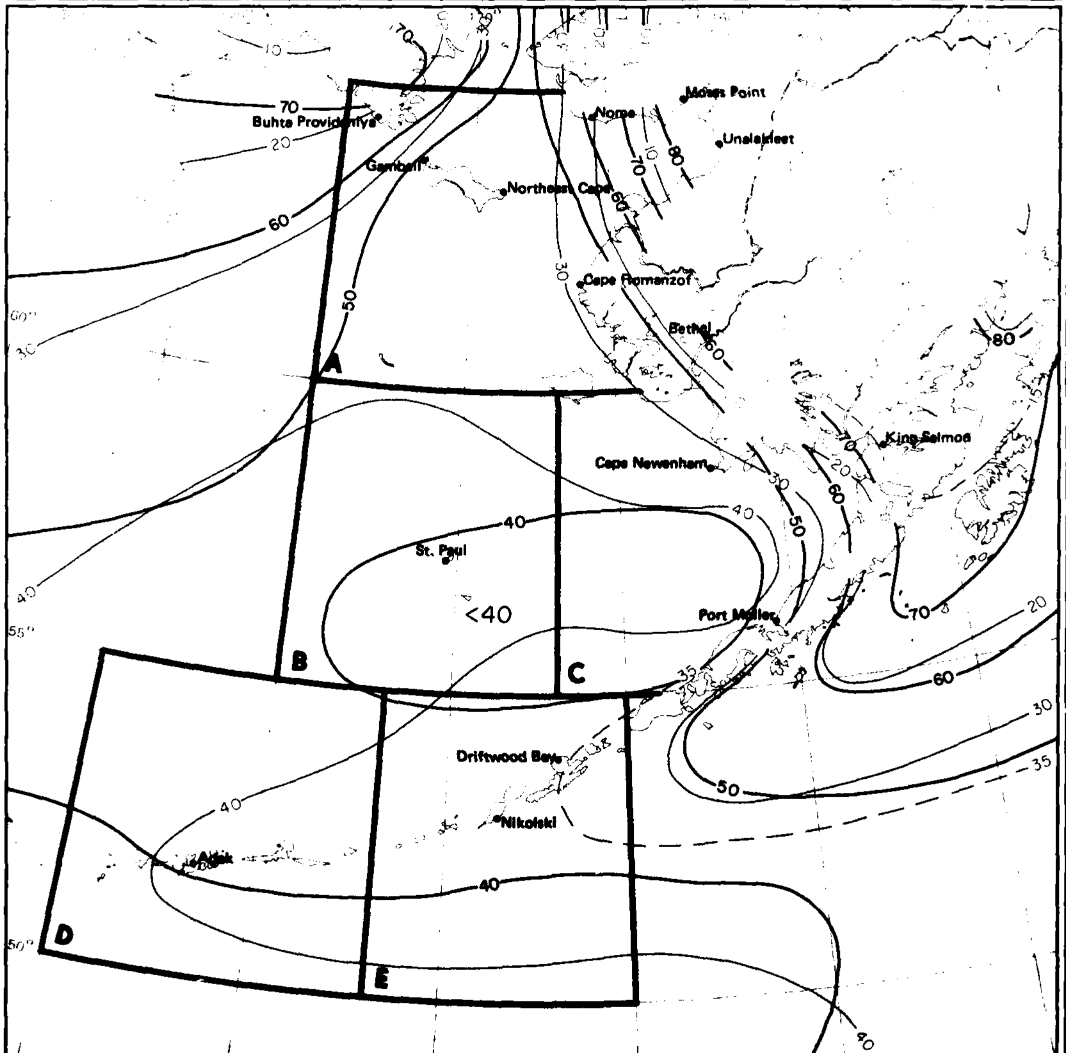
2202

Marine Area C

VISIBILITY

LOW CLOUD CEILING	<½	½<1	1<2	2<5	5<10	≥10
NC	·	·	·	[illegible]	·	4
50<80	[illegible]	[illegible]	[illegible]	·	·	·
35<50	·	[illegible]	·	[illegible]	[illegible]	[illegible]
20<35	[illegible]	·	·	[illegible]	4	[illegible]
10<20	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
6<10	[illegible]	[illegible]	[illegible]	5	[illegible]	4
3<6	·	·	[illegible]	3	[illegible]	2
1.5<3	[illegible]	·	·	·	·	·
0<1.5	[illegible]	3	3	3	[illegible]	·

4002



Marine Area D

VISIBILITY

LOW CLOUD CEILING	<½	½<1	1<2	2<5	5<10	≥10
NC	·	·	·	·	2	[illegible]
50<80	[illegible]	[illegible]	[illegible]	·	·	[illegible]
35<50	·	[illegible]	[illegible]	·	[illegible]	1
20<35	·	·	·	[illegible]	4	[illegible]
10<20	·	·	[illegible]	4	[illegible]	8
6<10	[illegible]	·	[illegible]	[illegible]	[illegible]	4
3<6	·	[illegible]	[illegible]	[illegible]	3	[illegible]
1.5<3	·	·	·	·	1	·
0<1.5	18	3	2	2	1	·

4839

Marine Area E

VISIBILITY

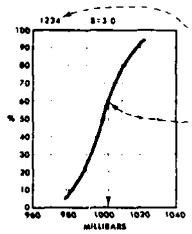
LOW CLOUD CEILING	<½	½<1	1<2	2<5	5<10	≥10
NC	·	·	·	·	2	8
50<80	0	0	0	·	·	1
35<50	·	0	·	·	1	2
20<35	·	·	·	2	5	[illegible]
10<20	1	·	1	4	8	8
6<10	1	·	1	4	5	5
3<6	·	·	1	2	2	1
1.5<3	·	·	·	·	·	·
0<1.5	19	2	2	1	1	·

5042

12 Low cloud ceiling and visibility thresholds **August**

Legend

Sea level pressure



Number of observations

Cumulative percent frequency of sea level pressures equal to or less than the pressure intersected by the curve

S: Standard deviation of pressure (mbs)

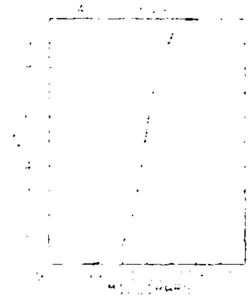
60% of all observed sea level pressures were ≤1002 millibars

Map - Mean sea level pressure

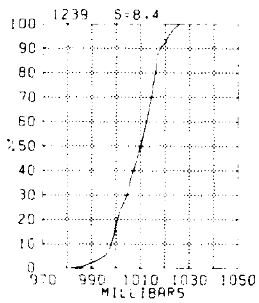
BLACK LINE Mean sea level pressure (millibars)

Sea level pressure is one of the most frequently recorded elements but one of the least accurate because of instrument and coding errors. Despite the inaccuracies of the individual readings, however, the large scale patterns and mean gradients of the isopleth analyses are relatively accurate.

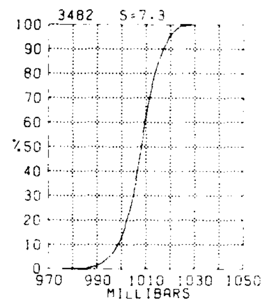
Buhta Provideniya



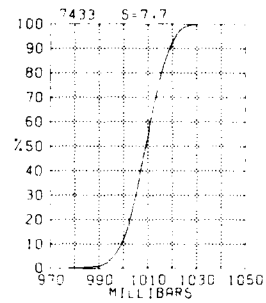
Gambell



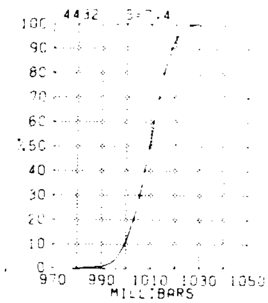
Northeast Cape



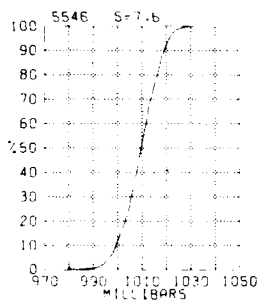
Nome



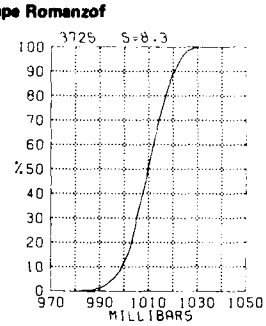
Moses Point



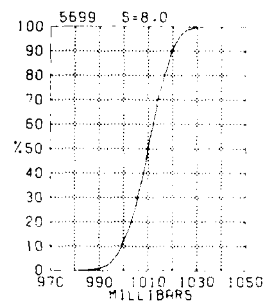
Unalakleet



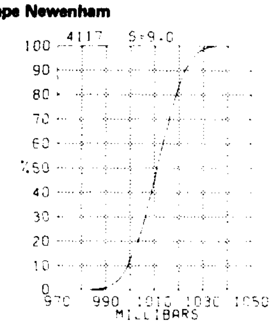
Cape Romanzof



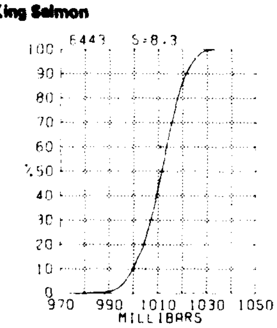
Bethel



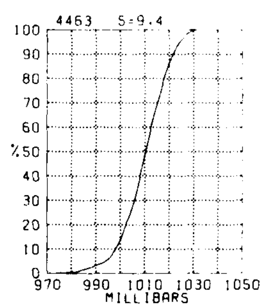
Cape Newenham



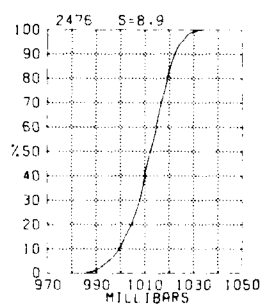
King Salmon



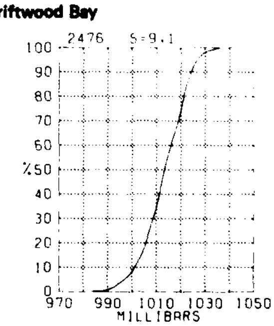
St. Paul



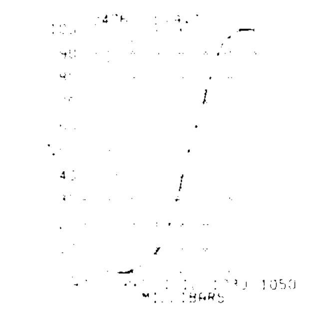
Port Moller



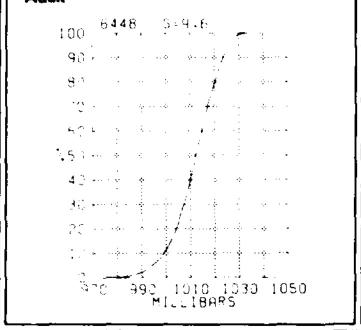
Driftwood Bay



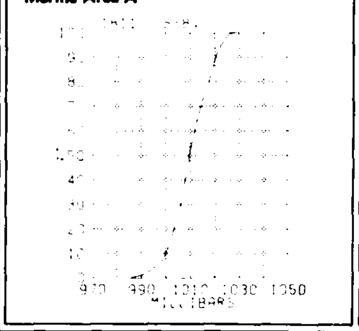
Nikolski



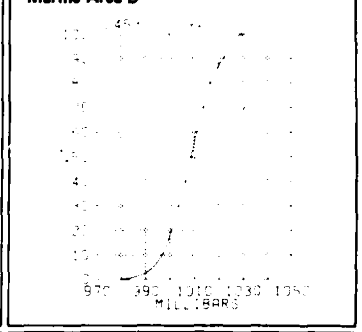
Adak

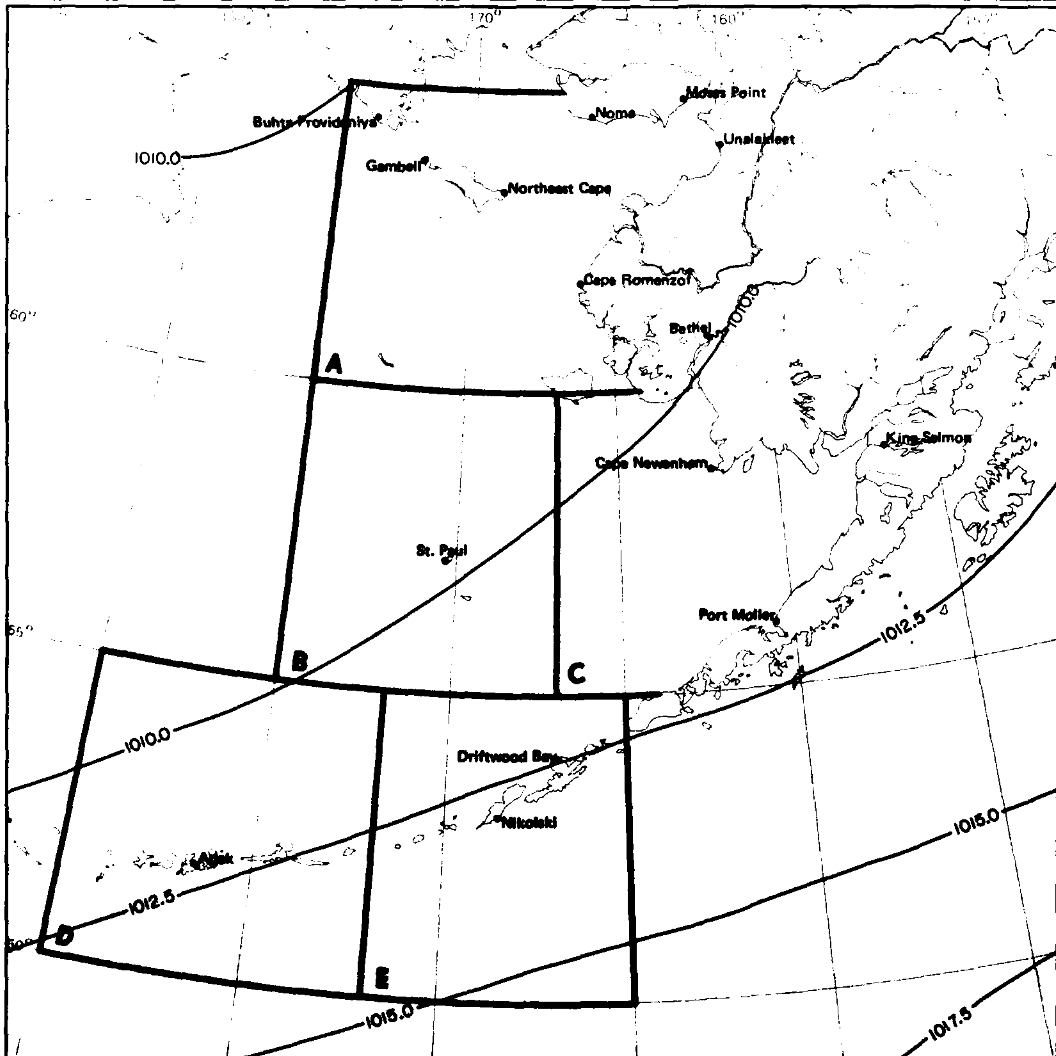


Marine Area A

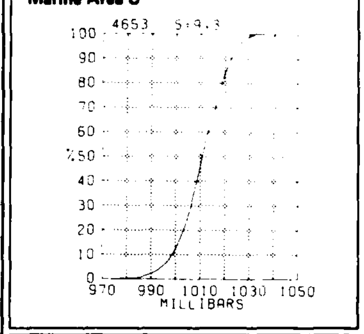


Marine Area B

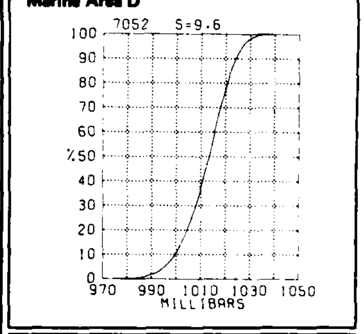




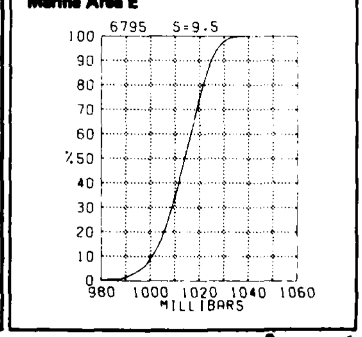
Marine Area C



Marine Area D

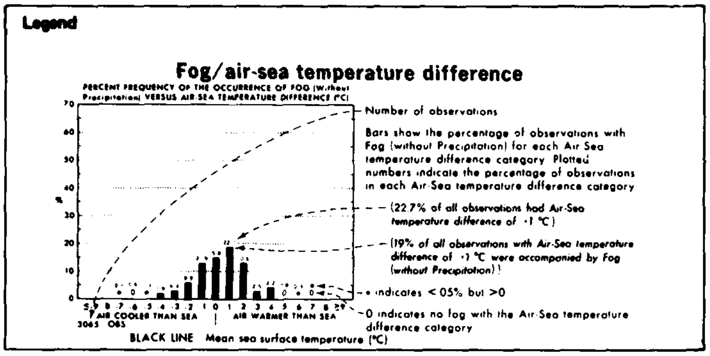


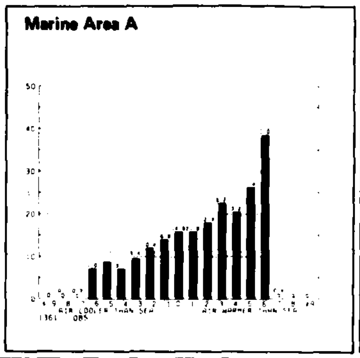
Marine Area E

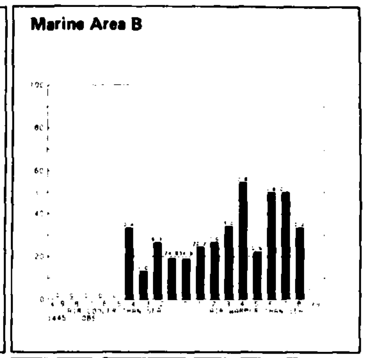


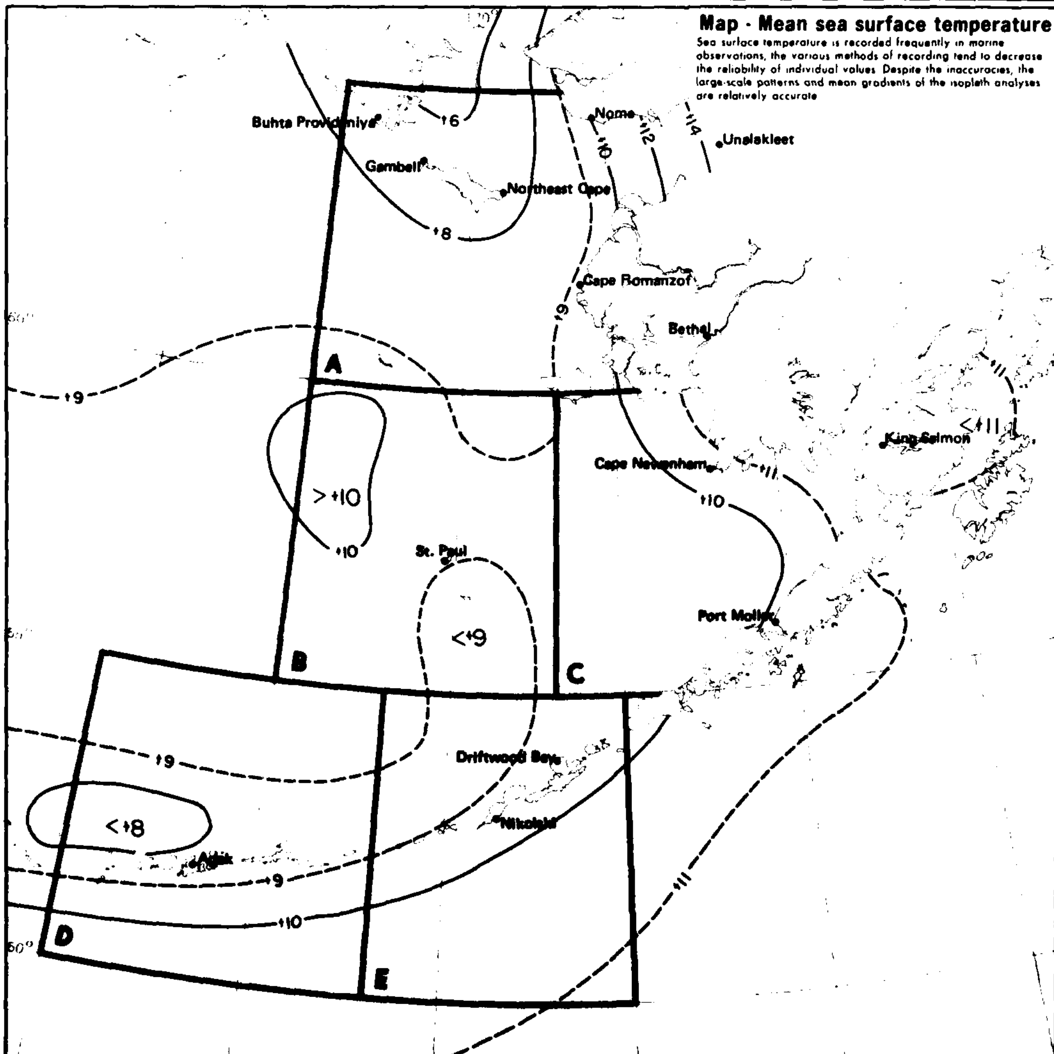
13 Mean sea level pressure

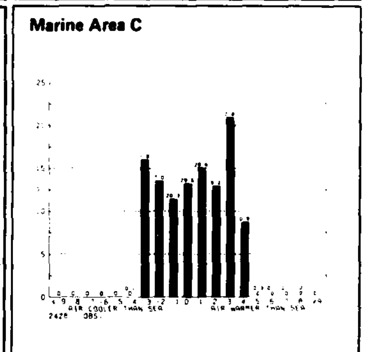
August

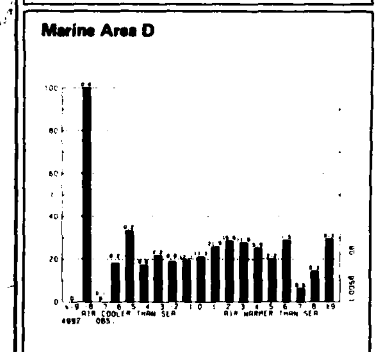


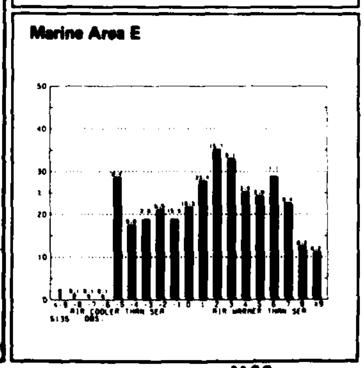








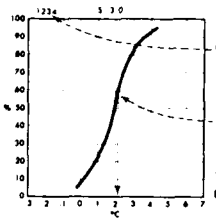




14 Fog/air-sea temperature difference
Mean sea surface temperature

Legend

Sea surface temperature



Number of observations

Cumulative percent frequency of sea surface temperatures equal to or less than the temperature intersected by the curve

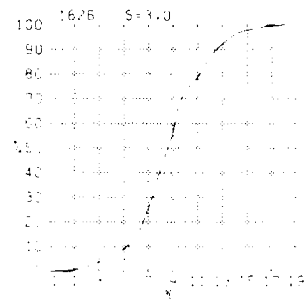
(60% of all observed sea surface temperatures were ≤2.1°C or ≤35.8°F)

S: Standard deviation of sea surface temperatures (°C)

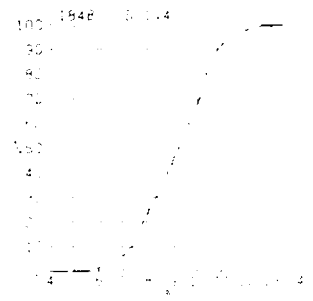
BLACK LINE Maximum (99%) sea surface temperature (°C) (1% of the temperatures were greater than the given value)

BLUE LINE Minimum (1%) sea surface temperature (°C) (1% of the temperatures were equal to or less than the given value)

Marine Area A

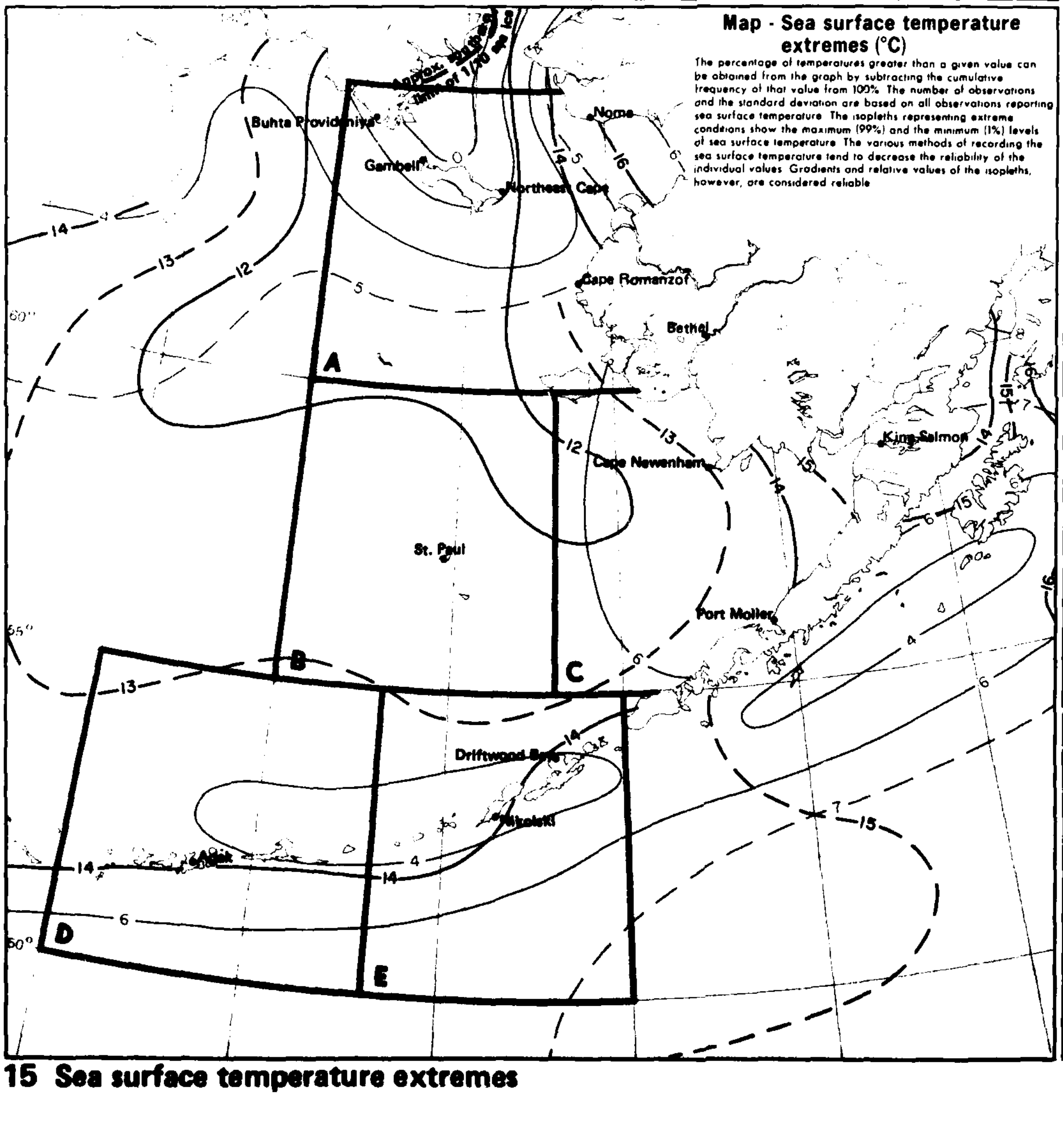


Marine Area B

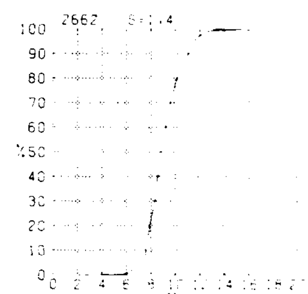


Map - Sea surface temperature extremes (°C)

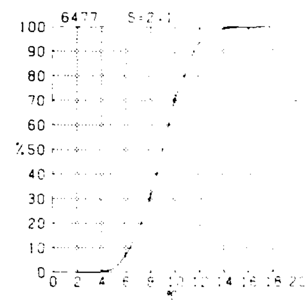
The percentage of temperatures greater than a given value can be obtained from the graph by subtracting the cumulative frequency of that value from 100%. The number of observations and the standard deviation are based on all observations reporting sea surface temperature. The isopleths representing extreme conditions show the maximum (99%) and the minimum (1%) levels of sea surface temperature. The various methods of recording the sea surface temperature tend to decrease the reliability of the individual values. Gradients and relative values of the isopleths, however, are considered reliable.



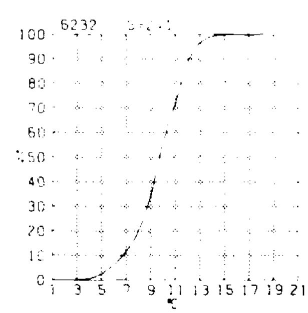
Marine Area C



Marine Area D



Marine Area E



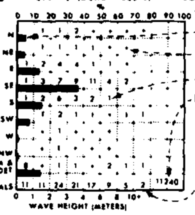
15 Sea surface temperature extremes

August

Legend **Wave height/direction**

Direction frequency (top scale) Bars represent percent frequency of waves from each direction

Height frequency (bottom scale) Printed figures represent percent frequency of wave heights observed from each direction



WAVE HEIGHT INTERVAL

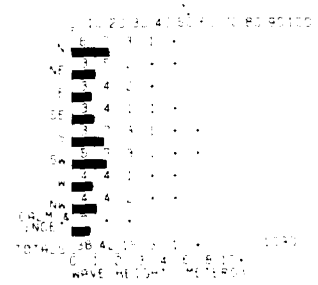
Feet	0-2	3-6	7-9	10-12	13-19	20-25	26-32	≥33	
Meters	0-.5	1-1.5	2-2.5	3-3.5	4-5.5	6-7.5	8-9.5	≥10	
	0	1	2	3	4	6	8	10+	

Printed scale on bottom of chart

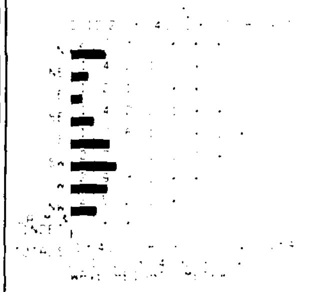
BLACK LINE - Percent frequency of wave height <1.5 meters (<5 feet)

BLUE LINE - Percent frequency of wave height <2.5 meters (<8 feet)

Marine Area A

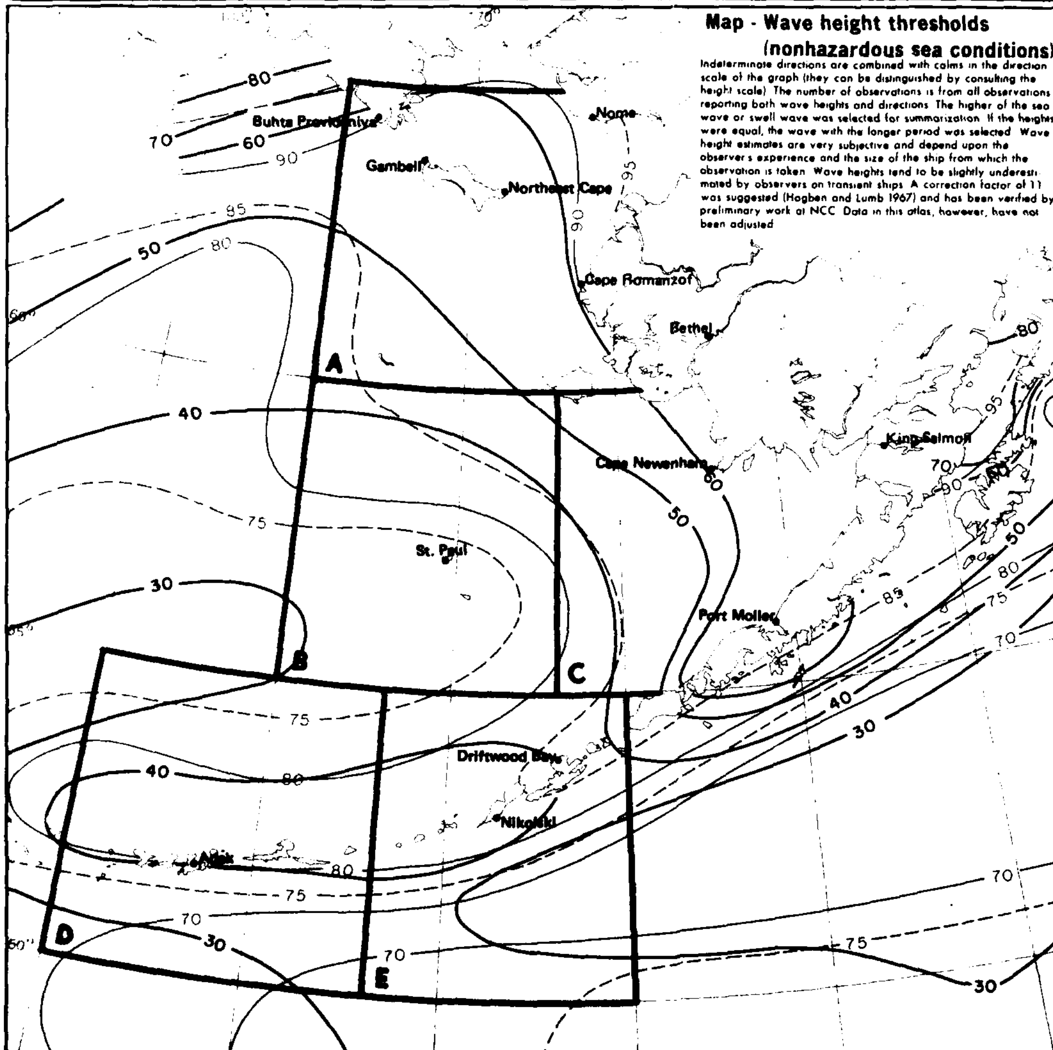


Marine Area B

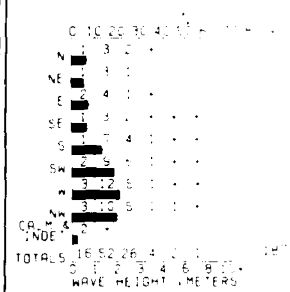


Map - Wave height thresholds (nonhazardous sea conditions)

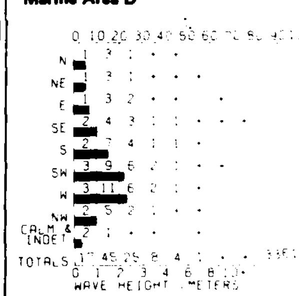
Indeterminate directions are combined with calms in the direction scale of the graph (they can be distinguished by consulting the height scale) The number of observations is from all observations reporting both wave heights and directions The higher of the sea wave or swell wave was selected for summarization If the heights were equal, the wave with the longer period was selected Wave height estimates are very subjective and depend upon the observer's experience and the size of the ship from which the observation is taken Wave heights tend to be slightly underestimated by observers on transient ships A correction factor of 1.1 was suggested (Hogben and Lumb 1967) and has been verified by preliminary work at NCC Data in this atlas, however, have not been adjusted



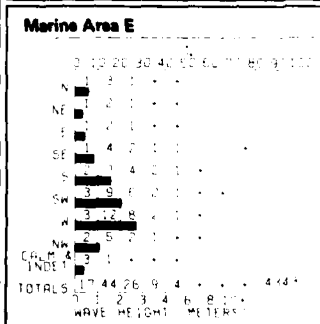
Marine Area C



Marine Area D

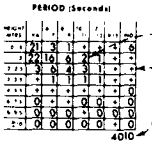


Marine Area E



Legend

Wave height/period



Percent frequency of occurrence of wave period and height

(2% of observed waves had a height of 1-1.5 meters and a period of 10-11 seconds.)

· indicates < 5% but >0

Number of observations

Waves are selected on the basis of the higher of sea and swell when both are reported. If both heights are equal, the wave with the longer period is selected.

BLACK LINE · Percent frequency of wave height ≥3.5 meters (≥12 feet)

BLUE LINE · Percent frequency of wave height ≥6 meters (≥20 feet)

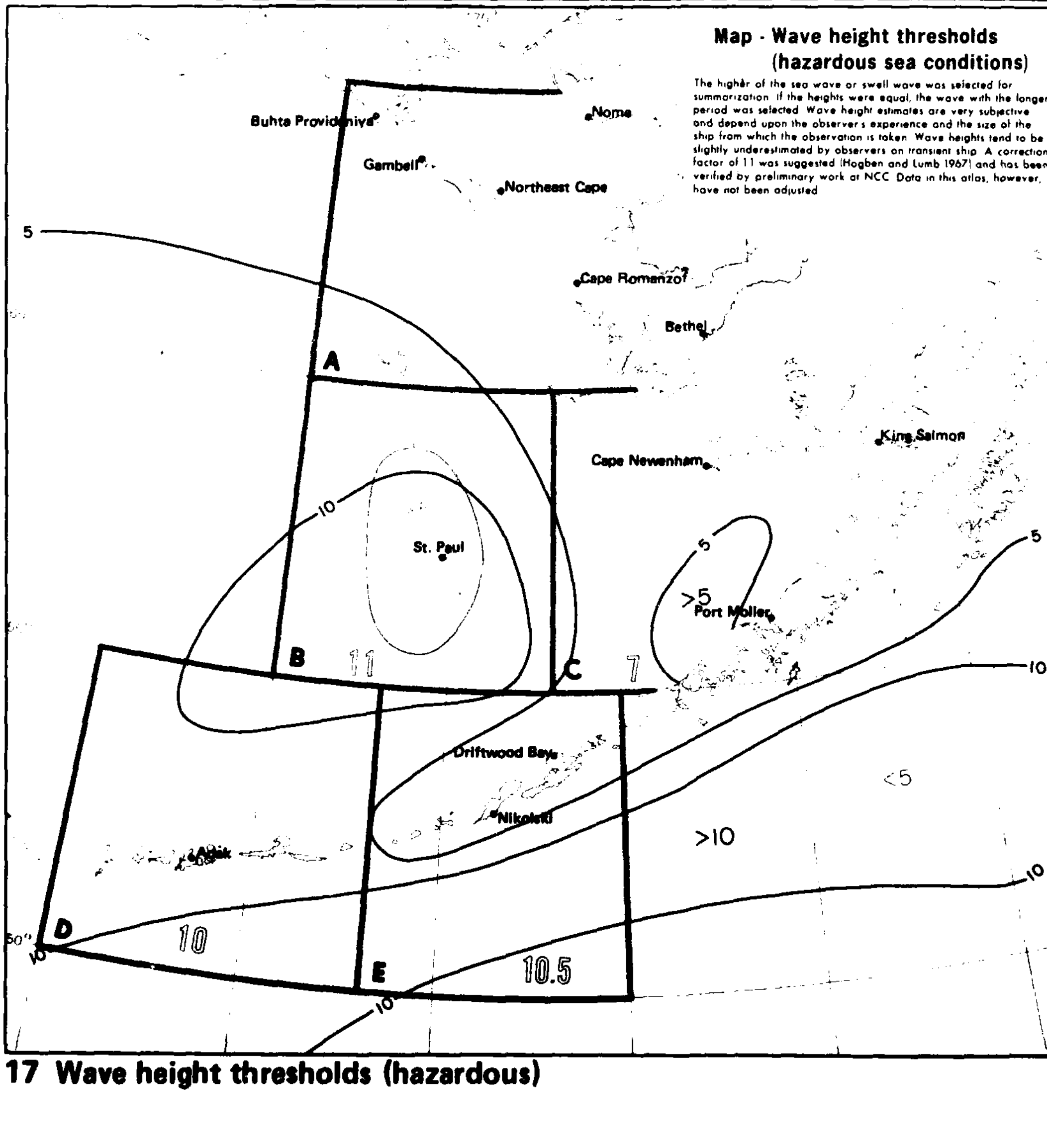
BLUE NUMBER · Maximum observed wave height (meters)

Marine Area A

Marine Area B

Map · Wave height thresholds (hazardous sea conditions)

The higher of the sea wave or swell wave was selected for summarization. If the heights were equal, the wave with the longer period was selected. Wave height estimates are very subjective and depend upon the observer's experience and the size of the ship from which the observation is taken. Wave heights tend to be slightly underestimated by observers on transient ship. A correction factor of 1.1 was suggested (Hogben and Lumb 1967) and has been verified by preliminary work at NCC. Data in this atlas, however, have not been adjusted.



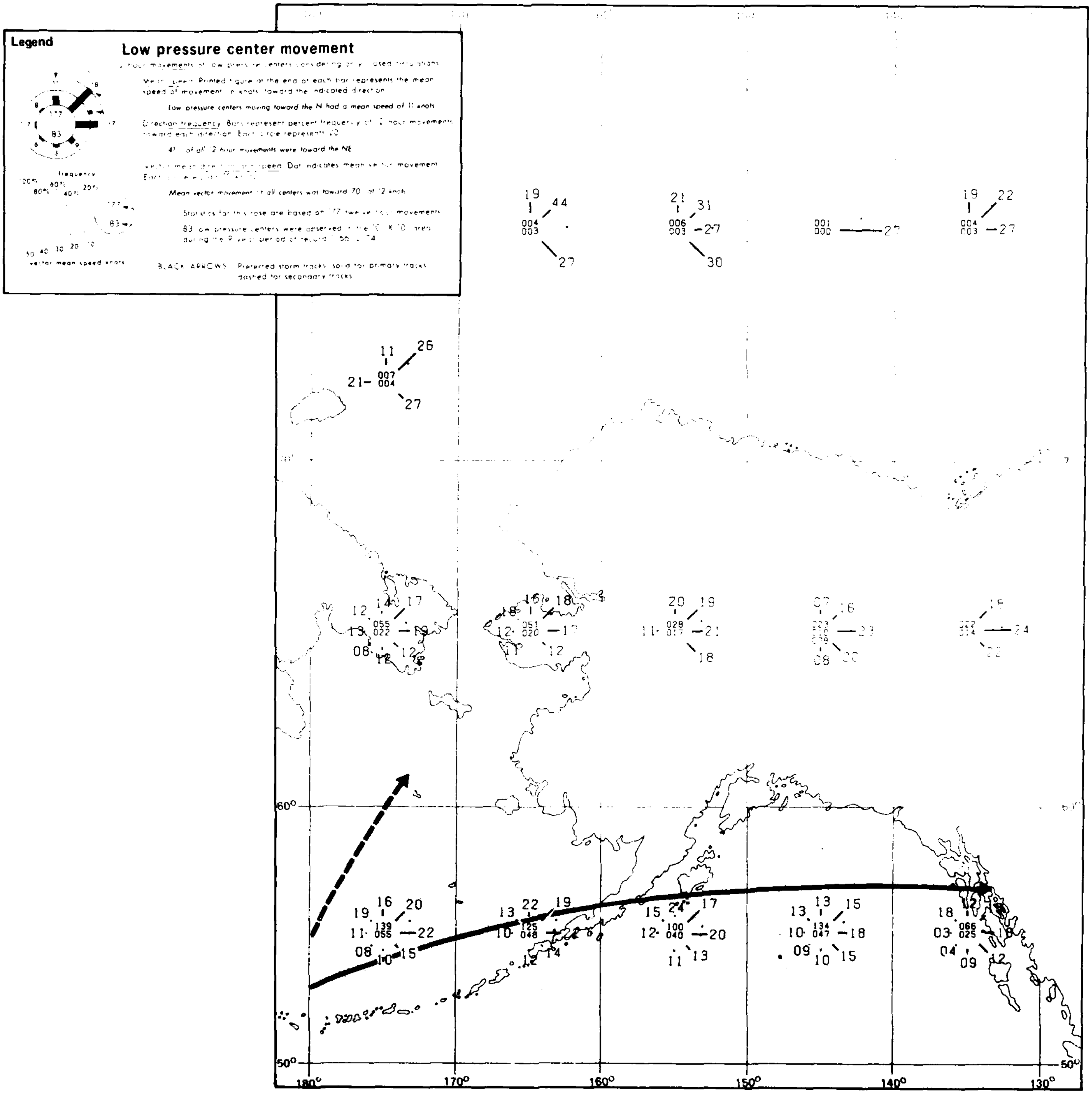
Marine Area C

Marine Area D

Marine Area E

17 Wave height thresholds (hazardous)

August

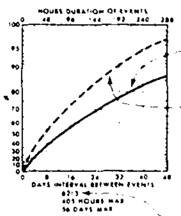


August

18 Low pressure center movement

Legend

Persistence of visibility <2 n. mi.



Hours duration of events   Days interval between events

Cumulative percent frequency of hours duration equal to or less than the number of hours intersected by the solid curve

(80% of the events had a duration ≤216 hours)

Cumulative percent frequency of days interval between events equal to or less than the number of days intersected by the broken curve

(88% of the events were followed by another event in 28 days or less)

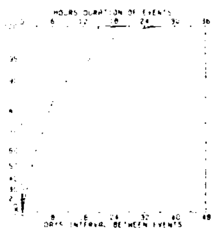
The maximum value(s) of hours duration and or the days interval will be displayed when the graph limits are exceeded

Durations and intervals for a particular month extend from the time they begin (or the first of the month if already in progress) and are terminated at the actual ending time, regardless of what month that may be

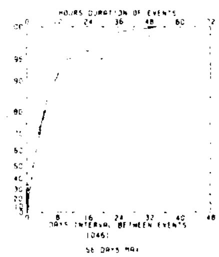
Number of observations

Top and bottom scales are variable to allow for variations in the data

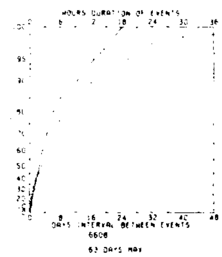
Adak



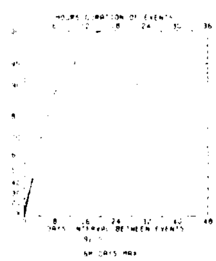
Nome



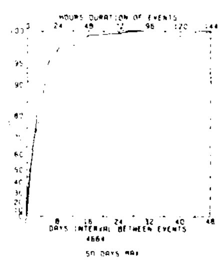
Moses Point



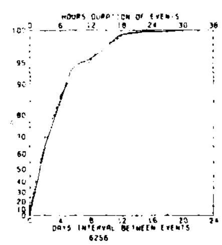
Unalakleet



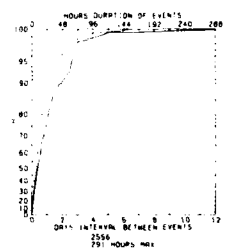
Cape Romanzof



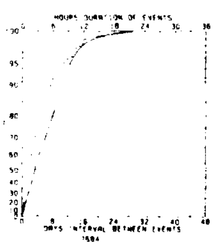
Bethel



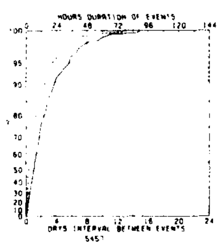
Nikolski



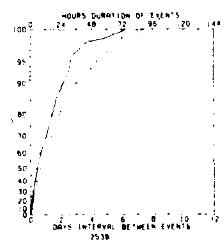
King Salmon



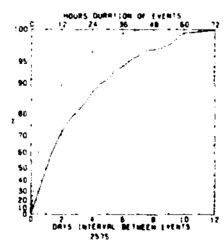
St. Paul



Port Moller



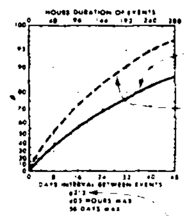
Driftwood Bay



19 Persistence of visibility <2 n. mi. **August**

Legend

Persistence of wind ≥10 kts.



Hours duration of events   Days interval between events

Cumulative percent frequency of hours duration equal to or less than the number of hours intersected by the solid curve

(80% of the events had a duration ≤216 hours

Cumulative percent frequency of days interval between events equal to or less than the number of days intersected by the broken curve

(88% of the events were followed by another event in 28 days or less

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Number of observations

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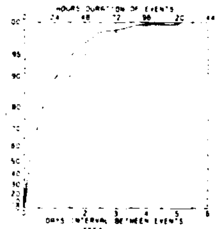
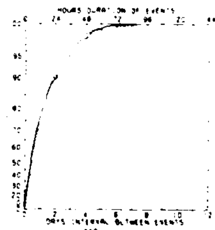
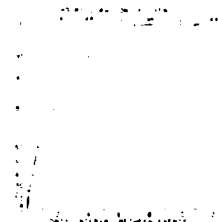
Adak



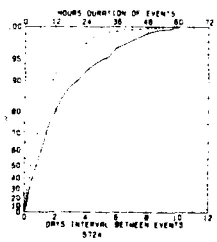
Nome



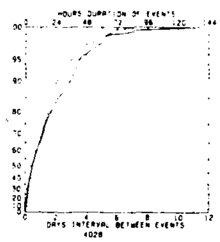
Moses Point



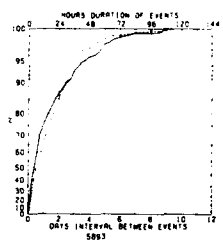
Unalakleet



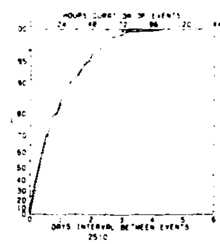
Cape Romanzof



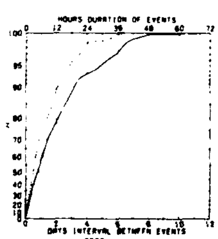
Bethel



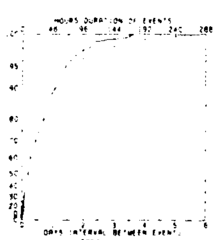
Nikolski



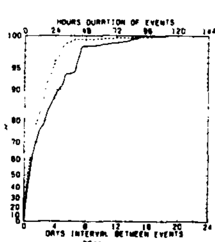
King Salmon



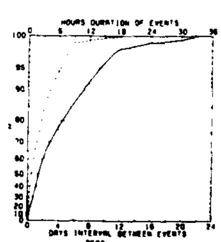
St. Paul



Port Moller



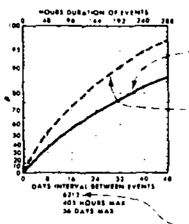
Driftwood Bay



Legend

Persistence of wind ≥20 kts.

Hours duration of events Days interval between events



Cumulative percent frequency of hours duration equal to or less than the number of hours intersected by the solid curve

--- (*80% of the events had a duration ≤216 hours.*)

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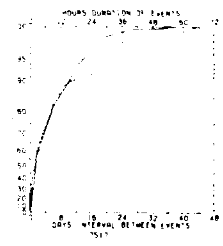
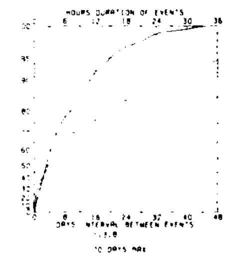
Number of observations

Top and bottom scales are variable to allow for variations in the data

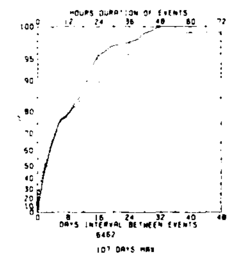
Adak



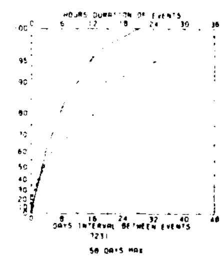
Nome



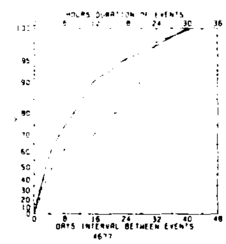
Moses Point



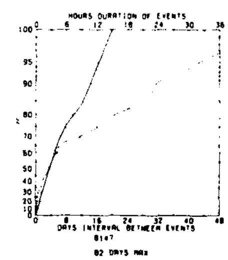
Unalakleet



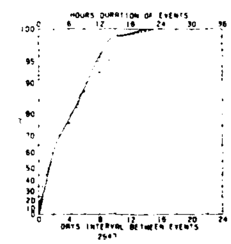
Cape Romanzof



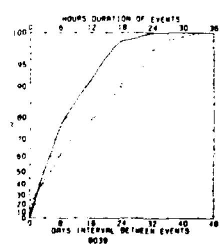
Bethel



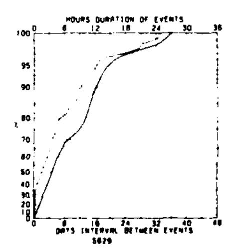
Nikolski



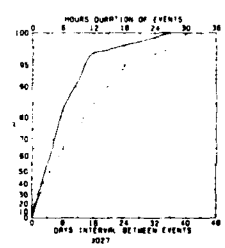
King Salmon



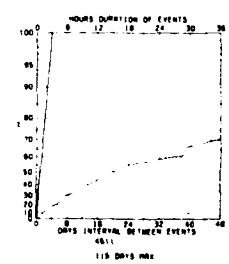
St. Paul



Port Moller



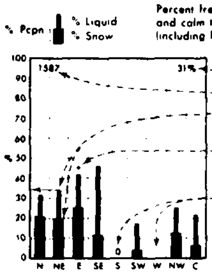
Driftwood Bay



21 Persistence of wind ≥20 kts.

Legend

Precipitation/wind direction



Percent frequency of surface wind observations from each direction and calm that were accompanied by precipitation, subdivided into liquid type (including freezing rain and freezing drizzle) and snow

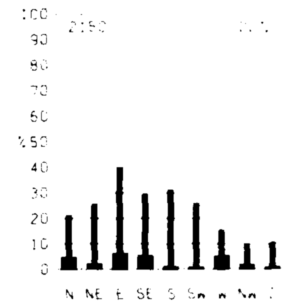
- Percentage of present weather observations reporting precipitation
- Number of observations
- (34% of all NE winds were accompanied by precipitation, of which 14% was liquid and 20% was snow)
- An asterisk in the column for a given direction (or calm) indicates that the percentage was based on 10-30 observations of present weather and wind direction
- 0 replaces bar when no precipitation was observed with winds from a given direction (or calm). No bar graph is presented if less than 10 observations containing present weather were reported for a given direction (or calm)

Map - Precipitation

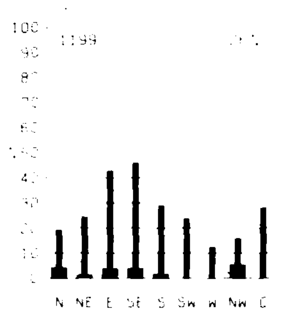
BLACK LINE Percent frequency of observations reporting precipitation

Of all the elements recorded in historical marine observations, precipitation is one of those most subject to interpretation error, from coding practices, observers preference for certain present weather codes, and other biases

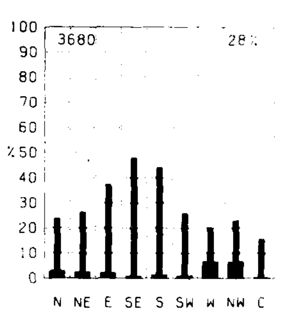
Buhta Provideniya



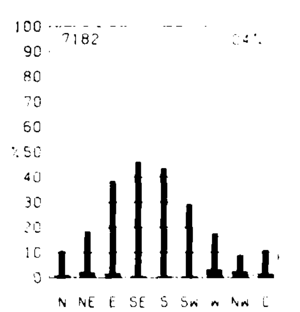
Gambell



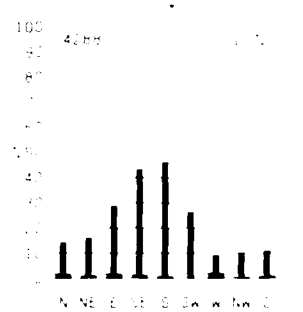
Northeast Cape



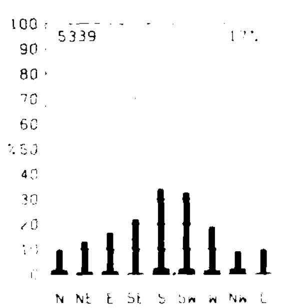
Nome



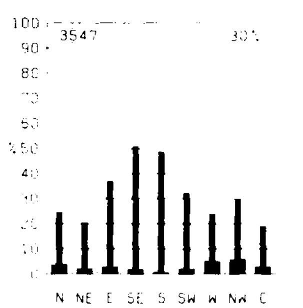
Moses Point



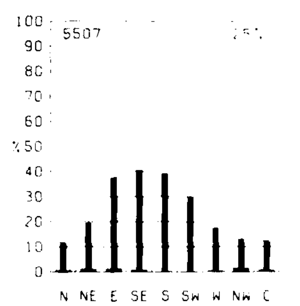
Unalakleet



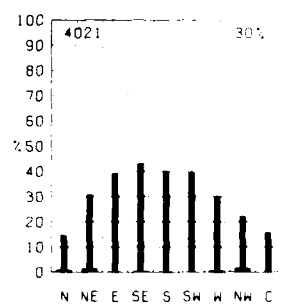
Cape Romanzof



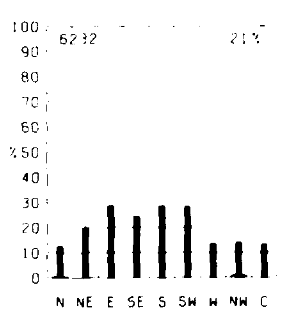
Bethel



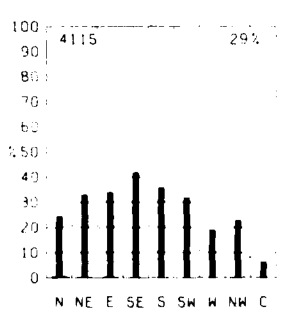
Cape Newenham



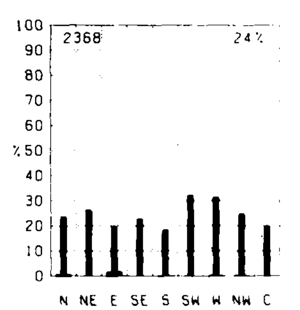
King Salmon



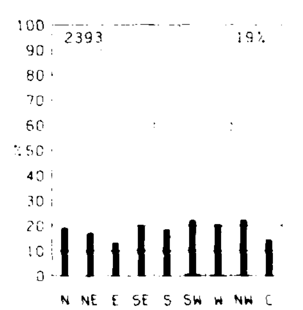
St. Paul

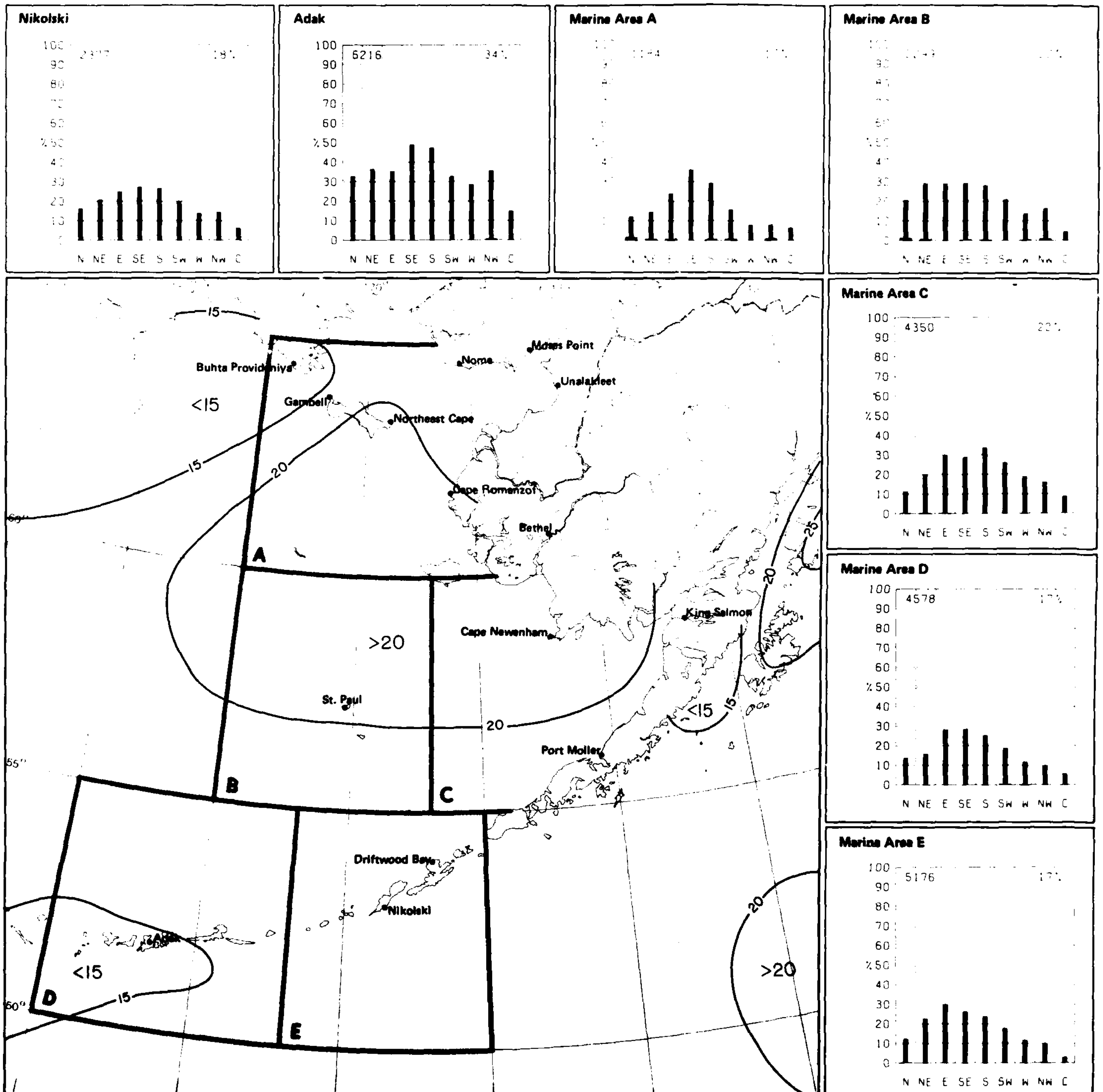


Port Moller



Driftwood Bay



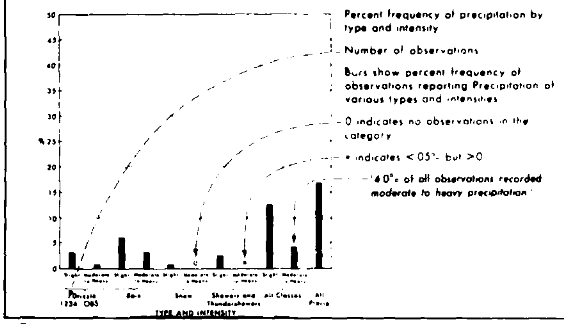


1 Precipitation

September

Legend

Precipitation types

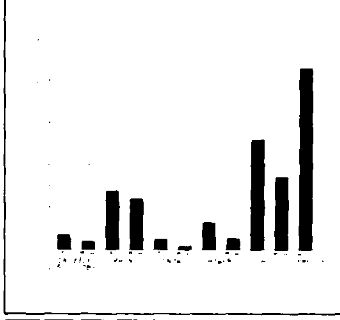


Map · Snow

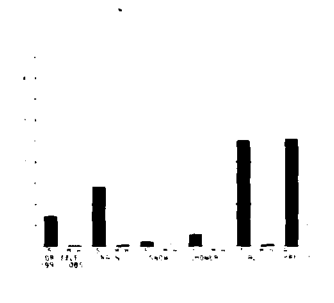
BLACK LINE Percent frequency of precipitation observations reporting snow

The percent frequency of observations reporting snow for a given point can be determined by multiplying the percent frequency of observations reporting precipitation (map 1) with that of precipitation observations reporting snow (map 2)

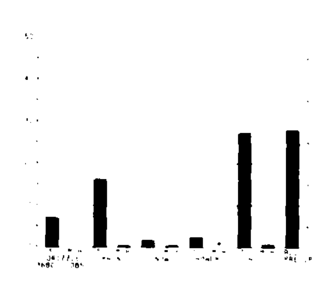
Buhta Provideniya



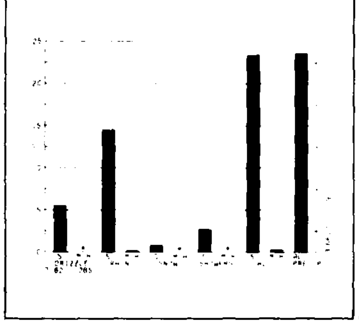
Gambell



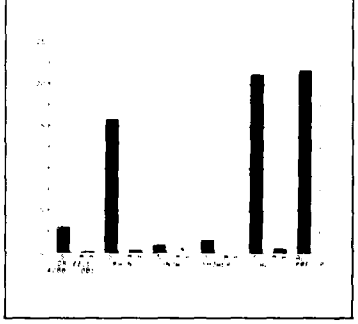
Northeast Cape



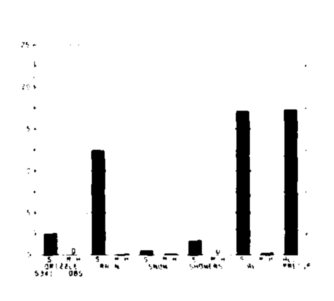
Nome



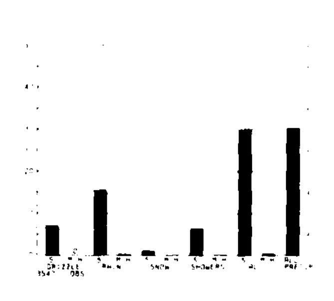
Moses Point



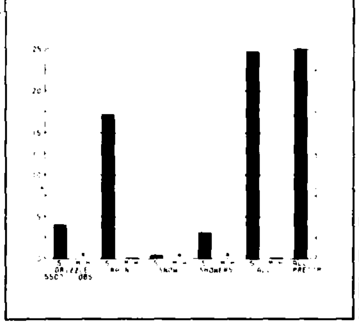
Unalakleet



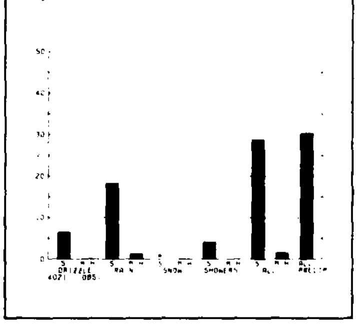
Cape Romanzof



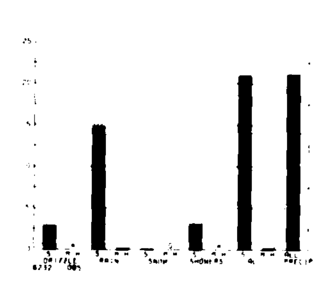
Bethel



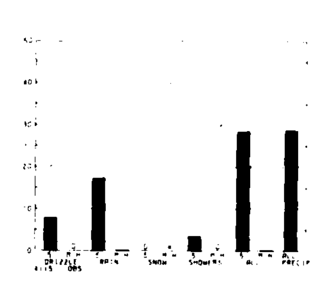
Cape Newenham



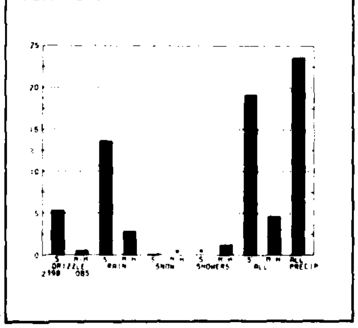
King Salmon



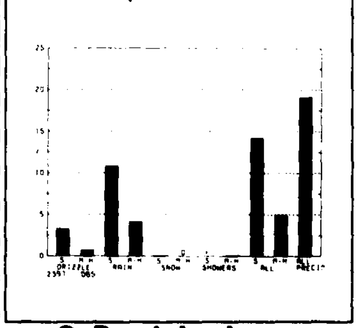
St. Paul

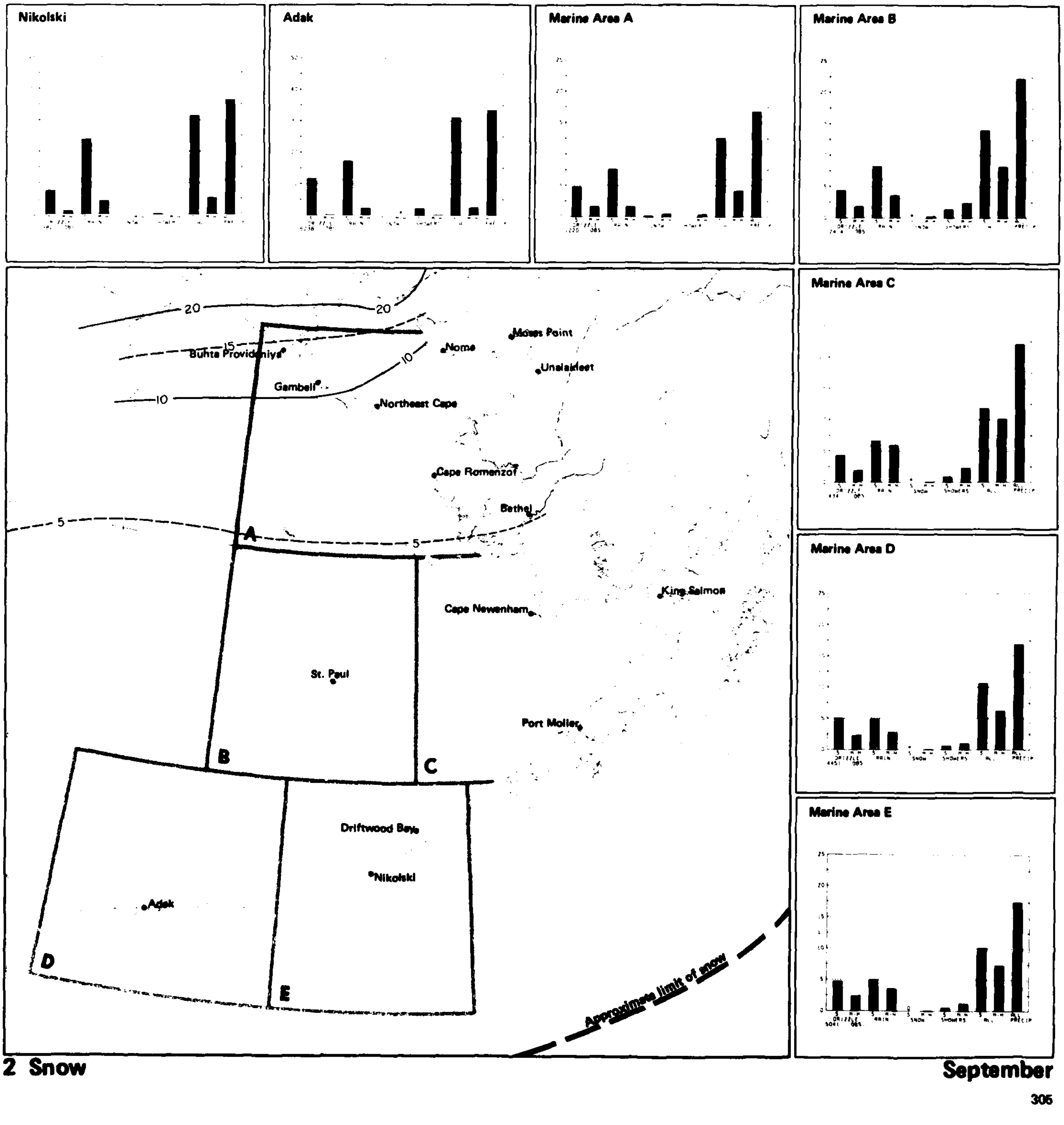


Port Moller



Driftwood Bay



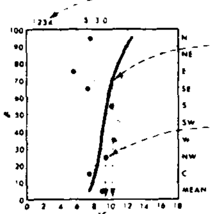


2 Snow

September

Legend

Air temperature/wind direction



Number of observations

Cumulative percent frequency of temperatures equal to or less than the temperature intersected by the curve

(70% of all temperatures were ≤10.3 °C or ≤50.5 °F)

S Standard deviation of temperatures (°C)

Mean temperature for each wind direction, calm and for all data combined are represented by dots

(With NW winds, the mean temperature was 9.4 °C or 48.9 °F)

Indicates that the mean temperature for a direction or calm was computed from 10-30 observations

The mean temperature is omitted when less than 10 observations for a direction or calm were available

Map - Air temperature mean and thresholds

BLACK LINE Percent frequency of temperature ≤0°C (≤32°F)

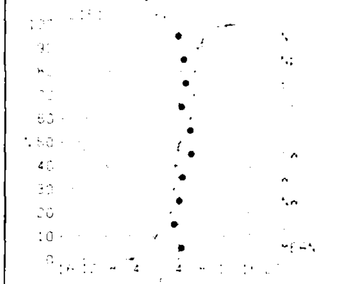
RED LINE Mean air temperature °C

BLUE LINE Percent frequency of wind chill temperature ≤-30°C (≤-22°F)

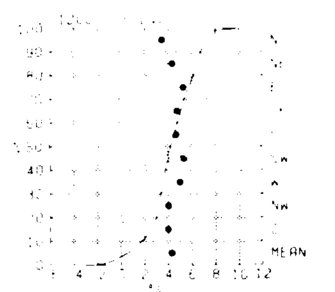
Air temperature readings recorded on transient ships in warm, sunny weather appear biased toward high temperatures, apparently because of improper instrument exposure and ventilation. Despite the inaccuracies, the large-scale patterns and mean gradients of the isopleth analyses are relatively accurate.

The temperature scale of the graph may vary in both range and class interval. The percentage of temperature observations greater than a given value can be obtained by subtracting the cumulative percent frequency of that value from 100%. The number of observations and the standard deviation plus the plotted points on the graphs are based on those observations reporting both temperature and wind direction. The cumulative curve is based on all observations reporting temperature with or without wind direction.

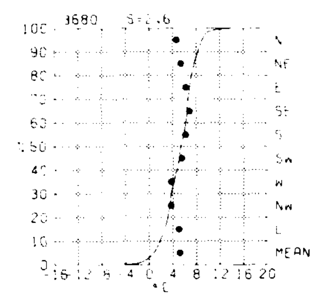
Buhta Provideniya



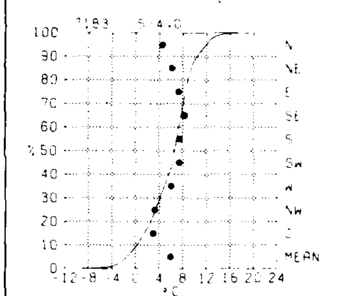
Gambell



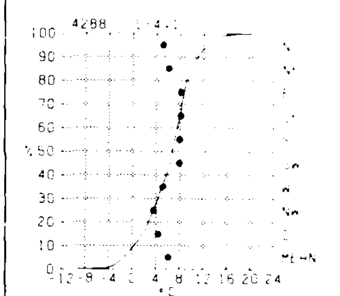
Northeast Cape



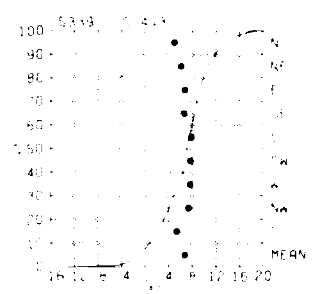
Nome



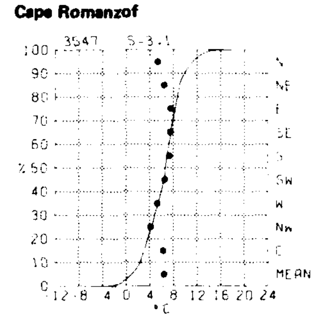
Moses Point



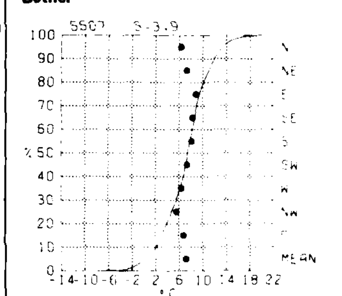
Unalakleet



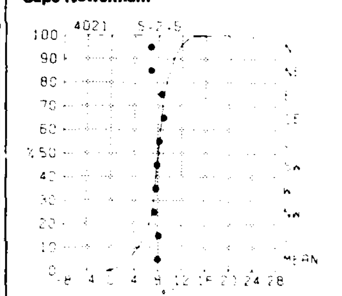
Cape Romanzof



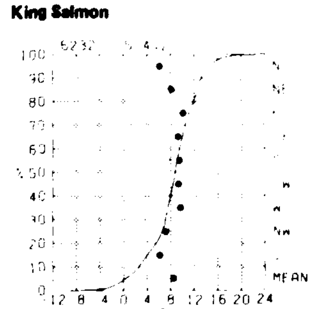
Bethel



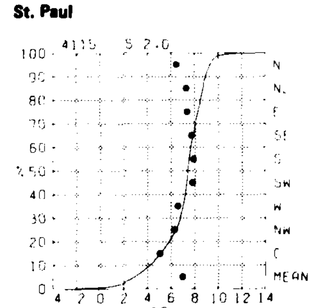
Cape Newenham



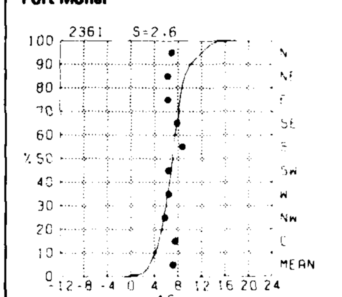
King Salmon



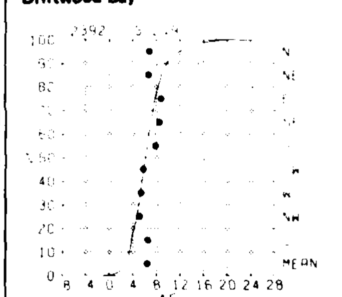
St. Paul

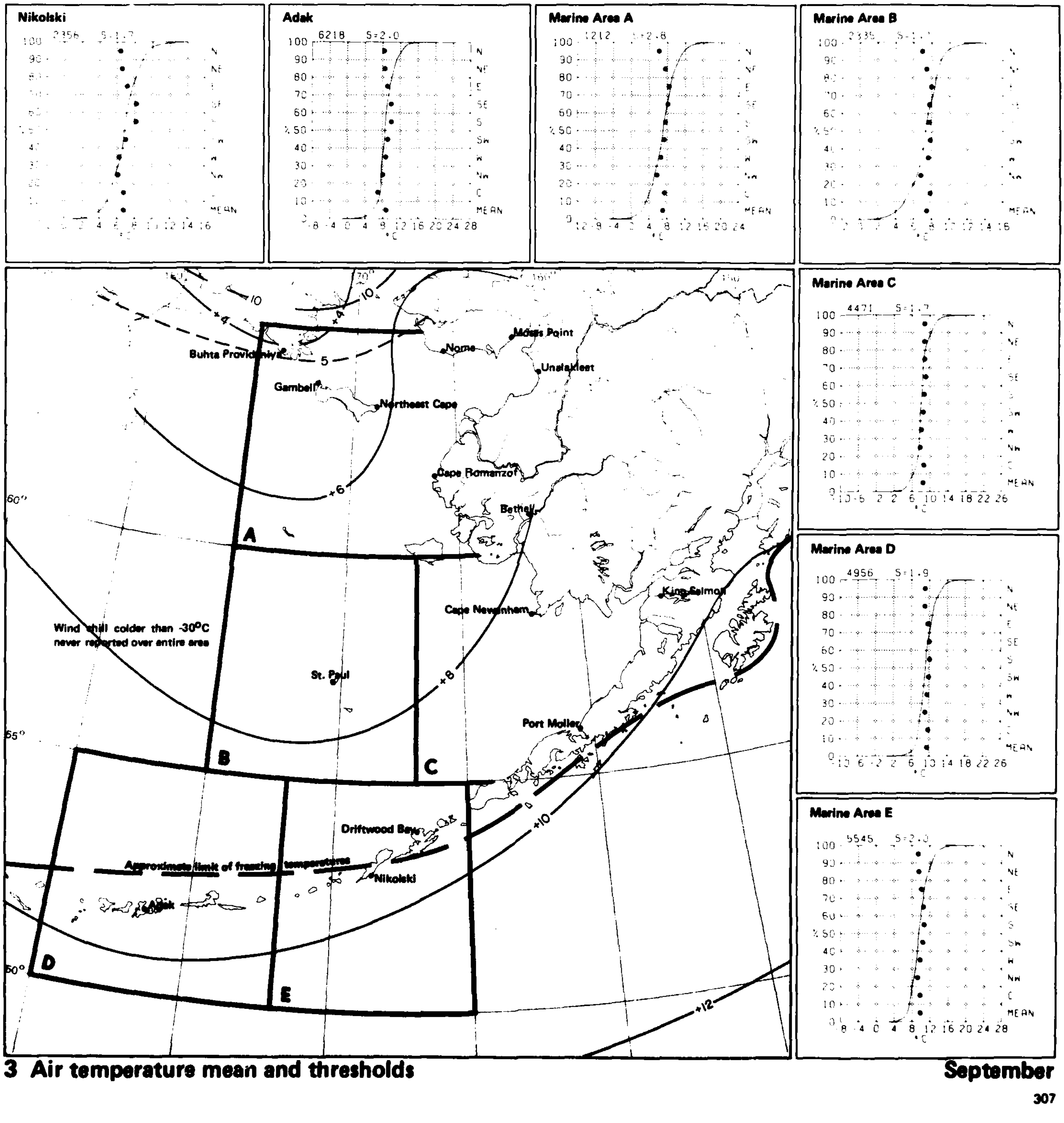


Port Moller



Driftwood Bay



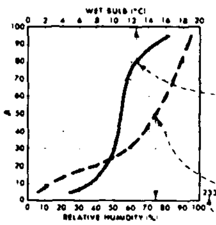


3 Air temperature mean and thresholds

September

Legend

Wet bulb/relative humidity



Cumulative percent frequency of wet bulb temperatures equal to or less than the temperature intersected by the curve (top scale)

Wet bulb (°C)

(80% of all observed wet-bulb temperatures were ≤12.5°C or 54.5°F)

Cumulative percent frequency of relative humidities equal to or less than the humidity intersected by the curve (bottom scale)

Relative humidity (%)

(50% of all observed relative humidities were ≤74%)

Number of observations

Map - Mean dew point temperature

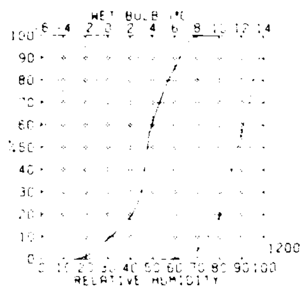
BLACK LINE Mean dew point temperature (°C)

The observation count of the graph reflects those observations reporting both air and wet bulb temperatures, both are required in computing the relative humidity. The percentage of observations of either element greater than a given value can be obtained by subtracting the cumulative percent frequency of that value from 100%.

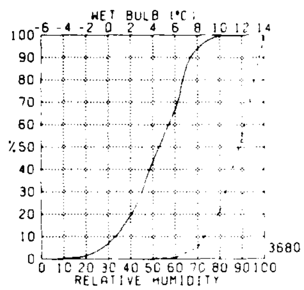
Buhta Provideniya

Insufficient Data

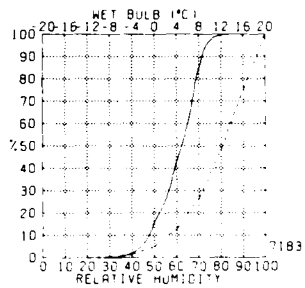
Gambell



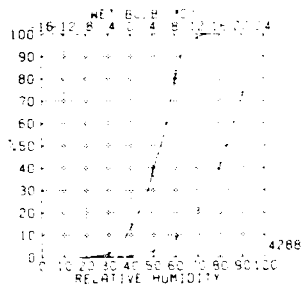
Northeast Cape



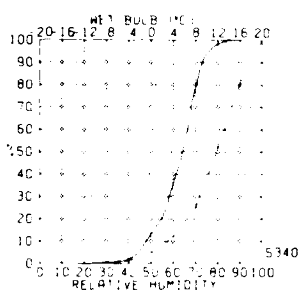
Nome



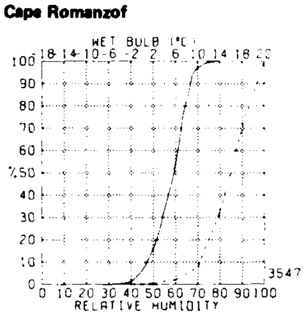
Moses Point



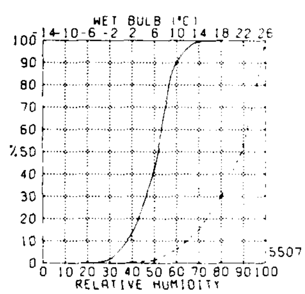
Unalakleet



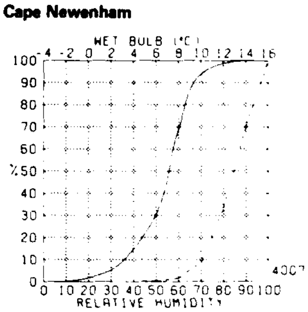
Cape Romanzof



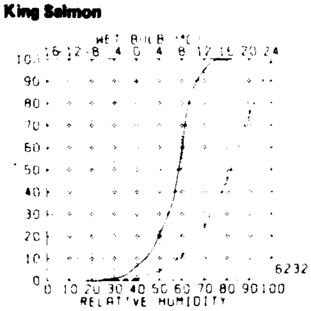
Bethel



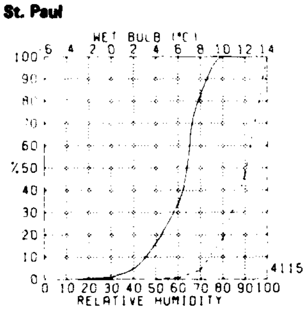
Cape Newenham



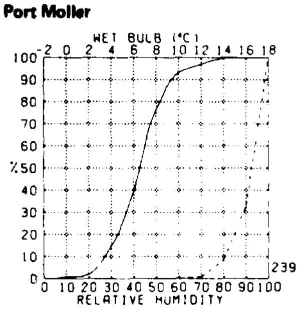
King Salmon



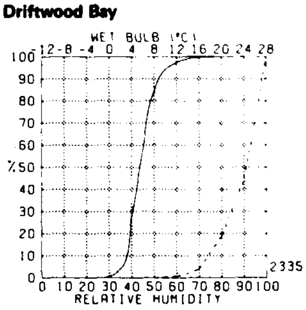
St. Paul

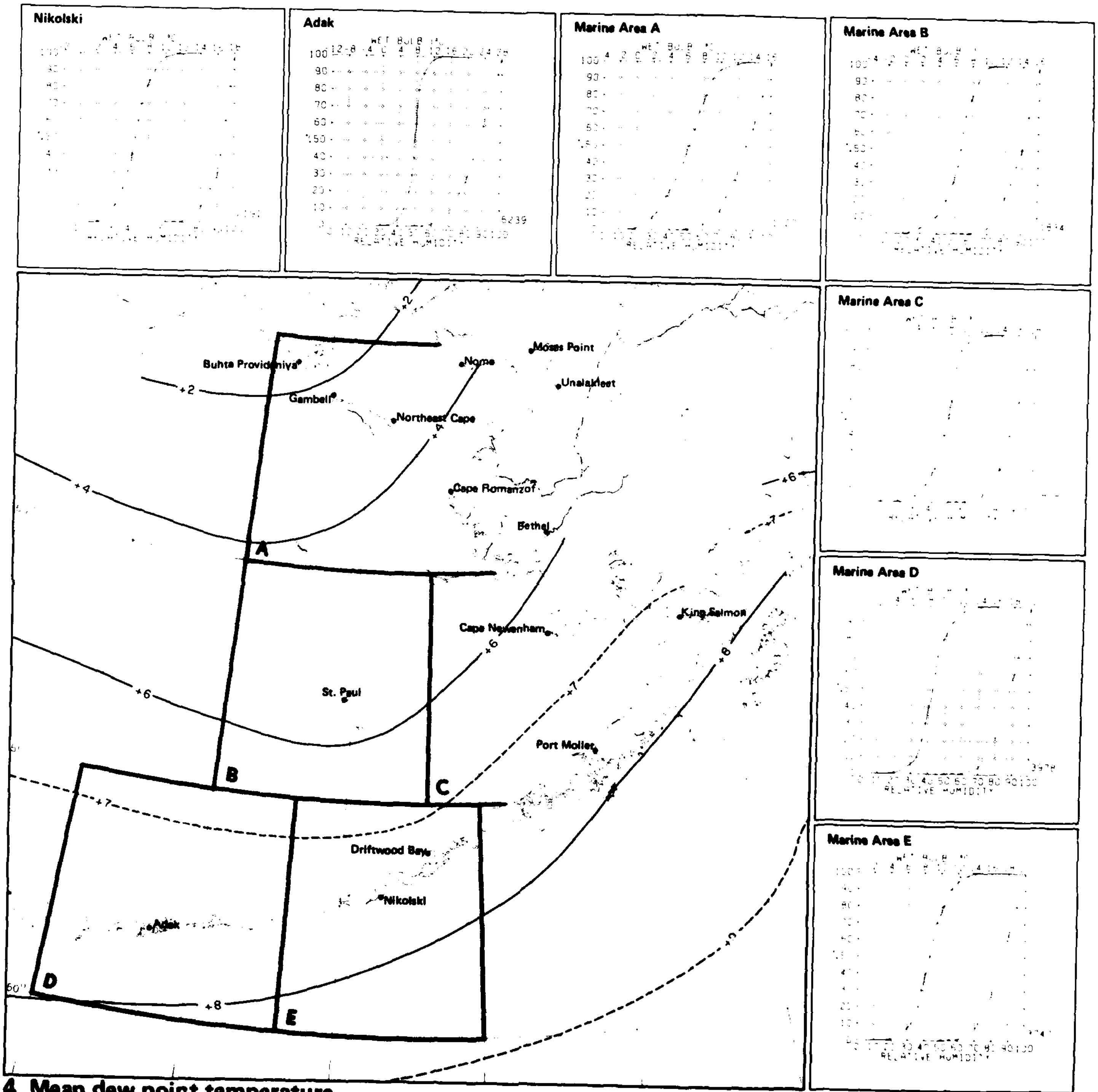


Port Moller



Driftwood Bay



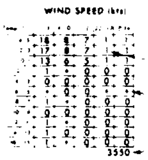


4 Mean dew point temperature

September

Legend

Air temperature/wind speed



Percent frequency of simultaneous occurrence of specified temperature (°C) and wind speed (knots)

1% of all observations reported temperature 2.3°C simultaneously with wind speed of 22-33 kts

Indicates < 5% but >0

Number of observations

Map · Air temperature extremes (°C)

BLACK LINE Maximum (99%) air temperature (1% of temperatures were greater than the given value)

BLUE LINE Minimum (1%) air temperature (1% of temperatures were equal to or less than the given value)

The graph can be used to determine the extent of human discomfort from the combined effects of extreme heat or cold and winds or to estimate the likelihood of superstructure icing. Icing potential increases as the air temperature drops below freezing and the winds increase above 10 knots (12 mph) and may become quite severe with temperatures equal to or less than -9°C (16°F) and winds equal to or greater than 34 knots (39 mph).

Buhta Provideniya

[illegible]

Gambell

[illegible]

Northeast Cape

[illegible]

3680

Nome

[illegible]

7183

Moses Point

[illegible]

Unalakleet

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥34
[illegible]	[illegible]	+	+	[illegible]	0
[illegible]	+	+	+	[illegible]	[illegible]
[illegible]	[illegible]	+	+	[illegible]	0
[illegible]	+	1	1	[illegible]	[illegible]
[illegible]	+	1	1	+	[illegible]
[illegible]	1	4	+	+	0
[illegible]	1	5	1	+	0
[illegible]	[illegible]	10	9	1	0
[illegible]	4	11	9	1	+
4.5	1	5	4	+	0
≤3	4	12	5	1	0

5339

Cape Romanzof

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥34
18.19	0	+	0	0	0
16.17	+	+	0	0	0
14.15	+	+	+	0	0
12.13	+	2	1	0	0
10.11	1	5	3	+	0
8.9	2	9	11	1	+
6.7	3	13	12	2	+
4.5	2	6	5	1	+
2.3	2	5	5	1	+
0.1	1	1	2	1	+
≤-1	+	1	1	+	+

3547

Bethel

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥34
20.21	0	+	+	0	[illegible]
18.19	+	+	+	0	[illegible]
16.17	+	1	1	+	0
14.15	+	1	1	0	0
12.13	1	5	3	+	[illegible]
10.11	1	7	[illegible]	+	+
8.9	2	12	3	1	+
6.7	2	13	[illegible]	+	+
4.5	1	7	3	+	+
2.3	1	6	3	+	0
≤1	1	5	2	+	0

5507

Cape Newenham

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥34
18.19	0	0	+	+	[illegible]
16.17	+	+	+	+	[illegible]
14.15	+	+	+	+	[illegible]
12.13	1	2	1	1	[illegible]
10.11	4	7	6	+	+
8.9	5	18	14	1	+
6.7	3	12	10	1	[illegible]
4.5	1	3	3	+	[illegible]
2.3	1	2	2	+	[illegible]
0.1	+	1	+	+	0
-2.-1	+	+	+	0	0

4021

King Salmon

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥34
22.23	0	+	+	0	0
20.21	+	+	+	0	0
18.19	+	+	+	+	0
16.17	+	1	1	+	0
14.15	+	2	2	+	+
12.13	1	7	5	1	+
10.11	2	9	6	1	+
8.9	3	12	7	1	+
6.7	3	10	3	+	0
4.5	1	4	1	+	0
≤3	4	8	1	+	0

6232

St. Paul

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥34
12.13	0	+	+	0	0
10.11	0	1	2	1	0
8.9	1	11	25	5	+
6.7	1	13	19	5	+
4.5	+	4	4	2	+
2.3	+	3	1	+	+
0.1	+	1	+	+	0
-2.-1	+	+	+	0	0
-4.-3	0	+	0	0	0
-6.-5	0	0	0	0	0
-8.-7	0	0	0	0	0

4115

Port Moller

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥34
18.19	0	0	+	0	0
16.17	0	+	+	0	0
14.15	+	+	+	+	0
12.13	1	2	2	+	0
10.11	2	3	3	+	0
8.9	6	12	8	+	0
6.7	7	17	11	1	+
4.5	3	7	7	+	0
2.3	1	2	2	+	0
0.1	+	+	+	+	0
-2.-1	0	+	+	+	0

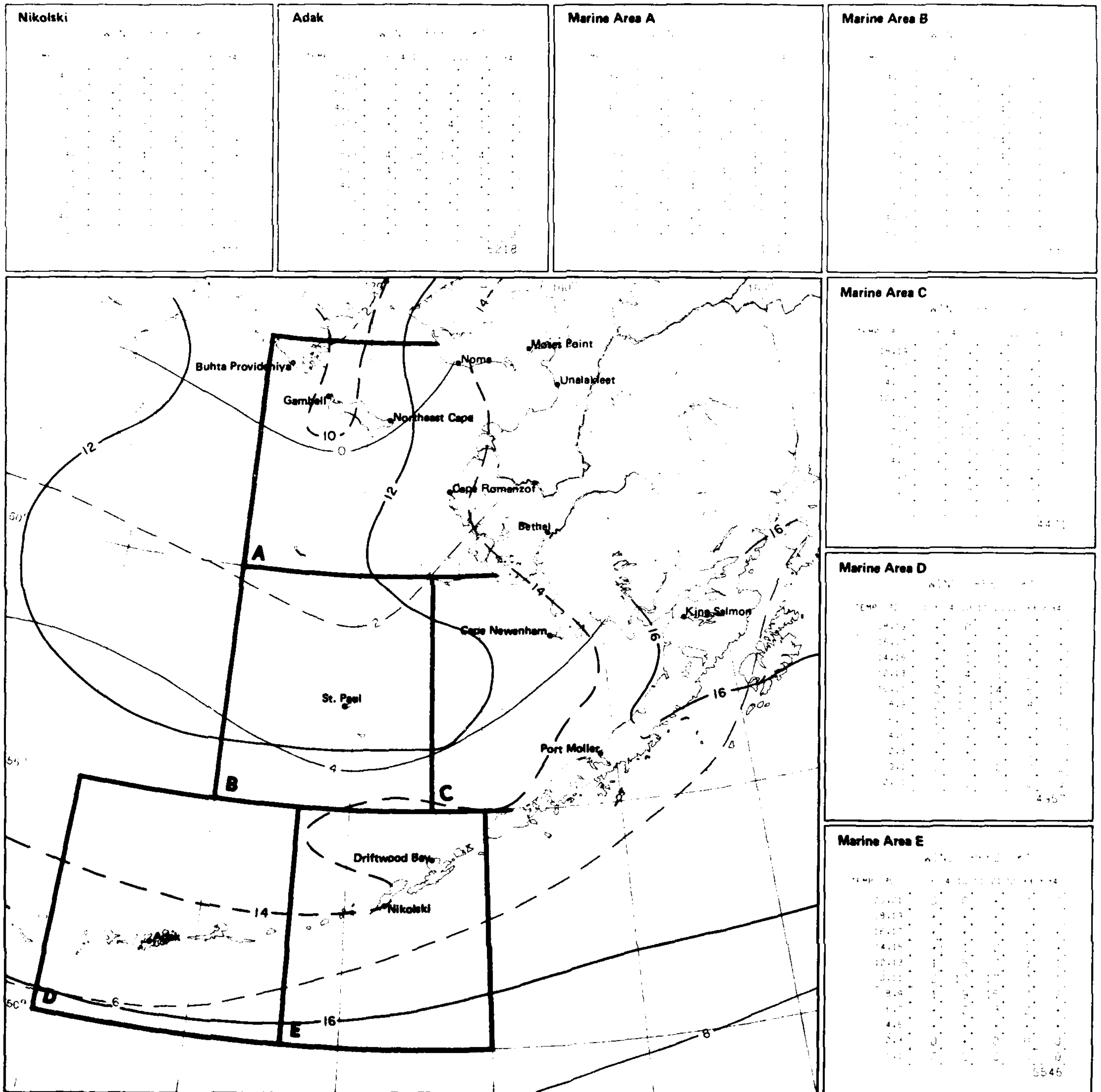
2361

Driftwood Bay

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥34
22.23	0	+	+	0	0
20.21	+	+	+	0	0
18.19	0	+	+	0	0
16.17	+	1	+	0	0
14.15	+	1	+	0	0
12.13	1	2	1	+	0
10.11	2	3	1	+	0
8.9	6	8	3	+	0
6.7	10	21	4	+	0
4.5	6	16	3	+	0
≤3	2	7	3	+	0

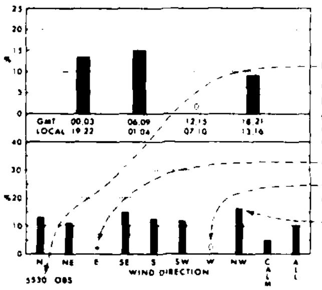
2392



5 Air temperature extremes (^{o}C) **September**

Legend

Fog/time and fog/wind direction



Number of observations

Bar graphs represent percent frequency of Fog (without precipitation) for various hour groupings and wind directions. Data are based on 100% for each hour group and direction category

* indicates < 05% but >0

0 indicates no fog occurred with the wind direction

Data show that 17% of all NW winds were accompanied by fog (without precipitation)

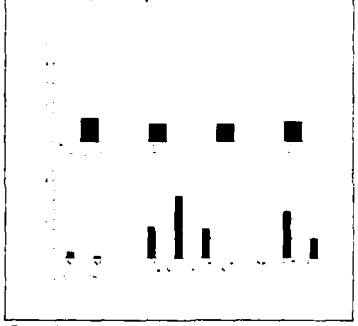
Map - Fog

BLACK LINE Percent frequency of occurrence of all fog

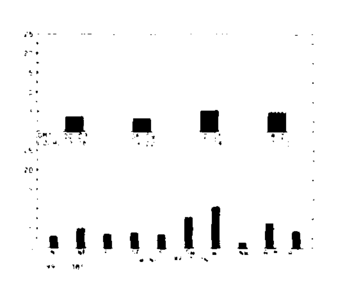
BLUE LINE Percent frequency of fog occurring without precipitation

The percent frequency of observations reporting fog with precipitation for a given point can be determined by computing the difference between the two analyses

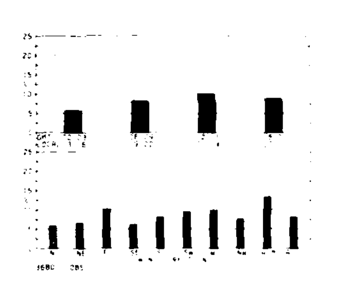
Buhta Provideniya



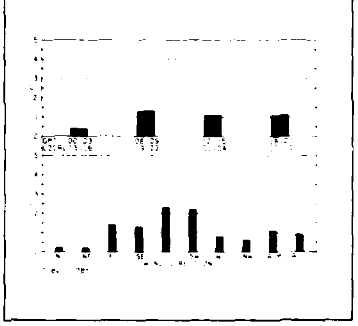
Gambell



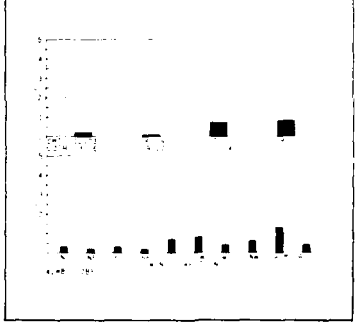
Northeast Cape



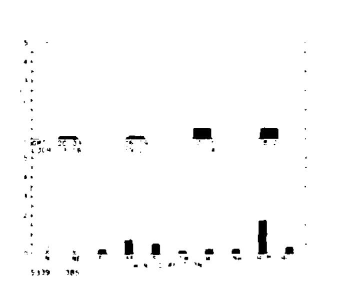
Nome



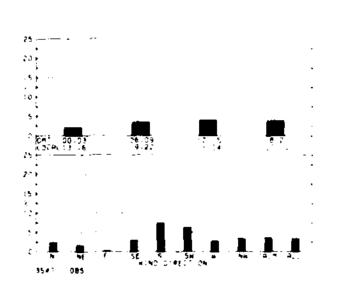
Moses Point



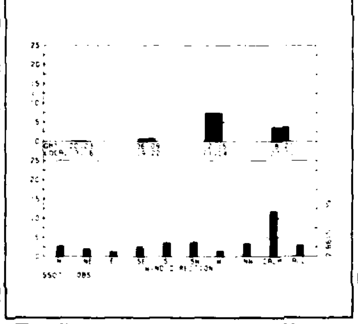
Unalakleet



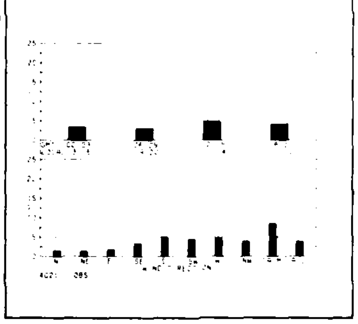
Cape Romanzof



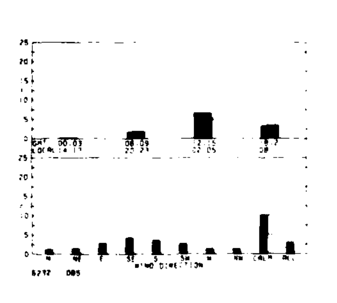
Bethel



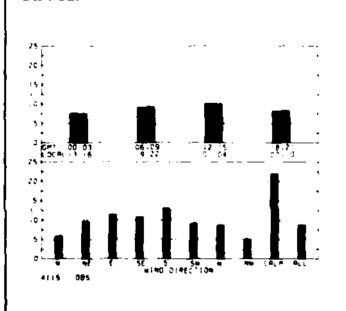
Cape Newenham



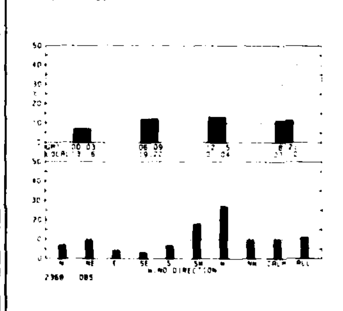
King Salmon



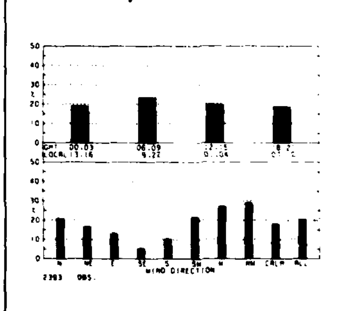
St. Paul

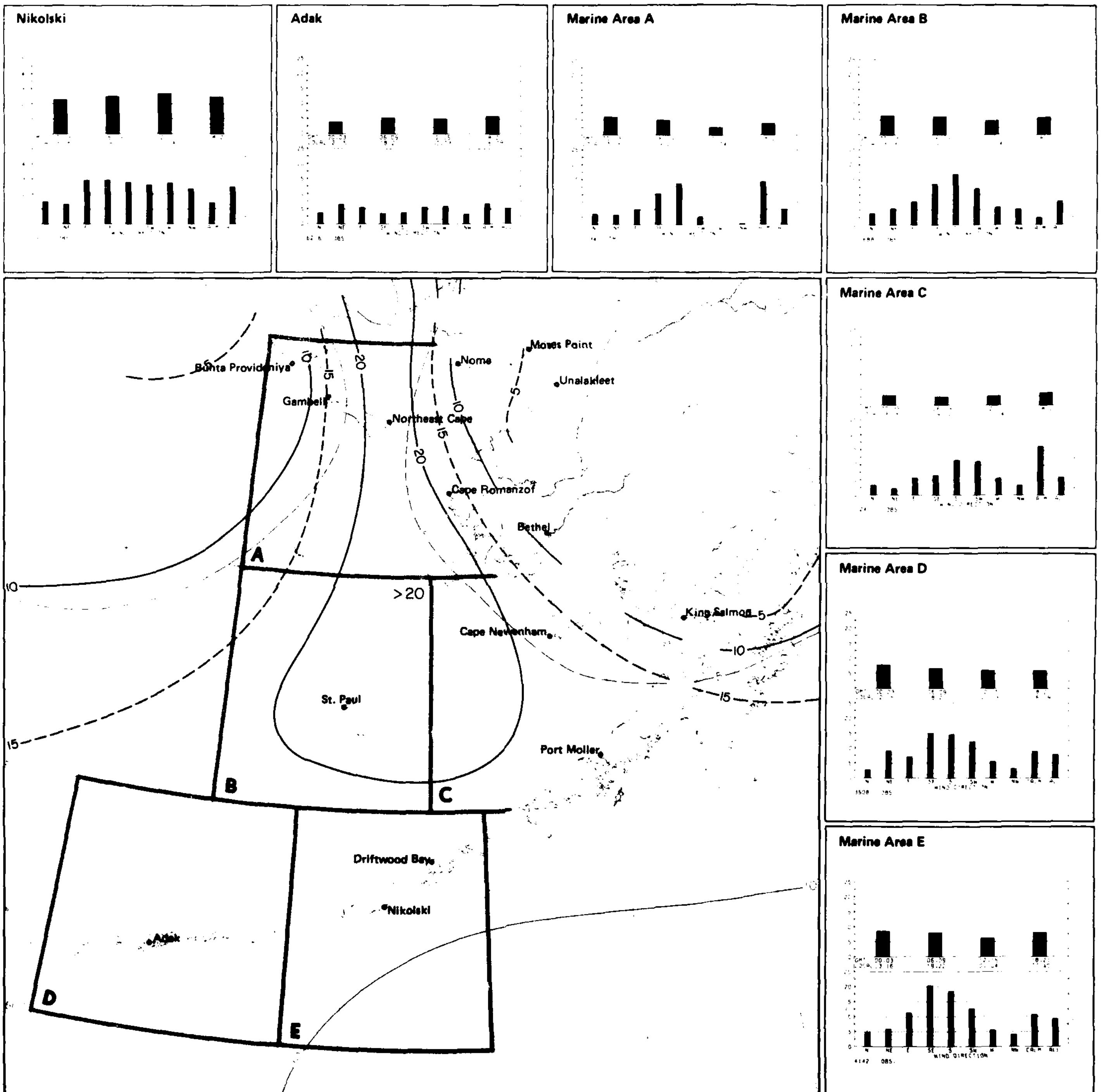


Port Moller



Driftwood Bay





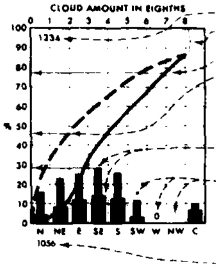
6 Fog **September**

Legend

Cloud cover/wind direction

Total Cloud Amount
Low Cloud Amount

Cumulative percent frequency of indicated cloud amount equal to or less than the amount intersected by the curve



Number of total cloud observations

Obscurations

(77% of all total cloud amounts were ≤7/8)

(46% of all low cloud amounts were ≤2/8)

Low cloud amount Percent frequency of observations from each direction and calm that were accompanied by low cloud amounts ≥5/8 and ≥7/8 Low clouds are clouds with bases <8000 feet

(28% of all SE winds were accompanied by low cloud amounts ≥5/8 and 14% by low cloud amounts ≥7/8.)

An asterisk indicates that the percentage is based on 10-30 observations of wind direction, total and low cloud amount 0 replaces bar graph when no low cloud amounts ≥5/8 were observed with a wind direction or calm 0 or bar is omitted when number of observations of total and low cloud amount from a wind direction or calm is less than 10

Number of low cloud observations.

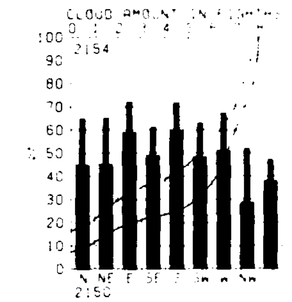
Map - Cloud amount thresholds

BLACK LINE Percent frequency of total cloud amount ≤2 8

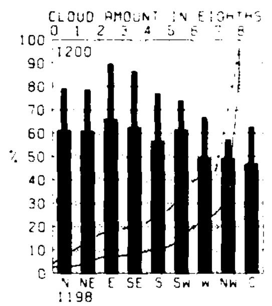
BLUE LINE Percent frequency of low cloud amount ≥5/8

Since the number of observations reporting low cloud amount is usually less than that for total cloud amount, somewhat different samples may be used to compute the two curves on the graph This may lead to inconsistencies where low cloud amount appears higher than the total cloud amount Where this occurred the graph was adjusted in favor of the total cloud by making the curves coincide The frequency of obscured conditions may be determined by subtracting the cumulative percent frequency corresponding to 8 8 coverage from 100% In computing the bar graph, obscurations are considered as 8/8 coverage

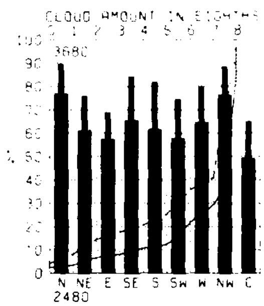
Buhta Provideniya



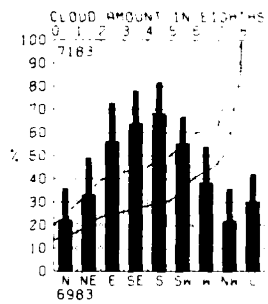
Gambell



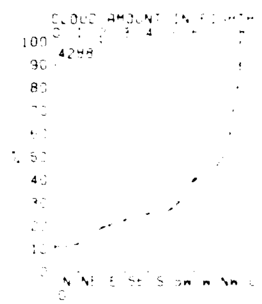
Northeast Cape



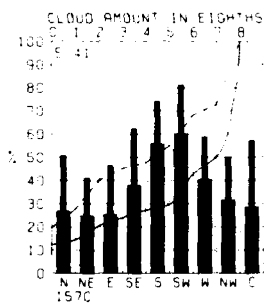
Nome



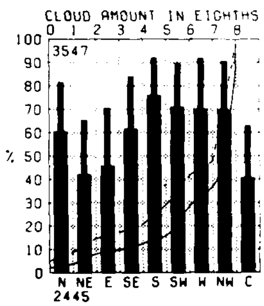
Moses Point



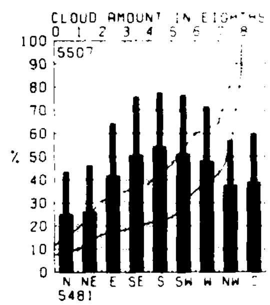
Unalakleet



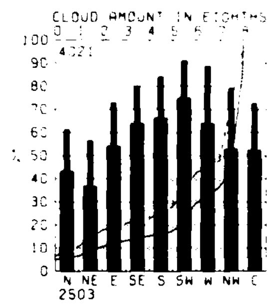
Cape Romanzof



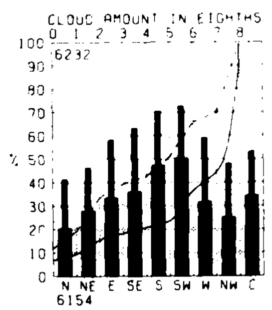
Bethel



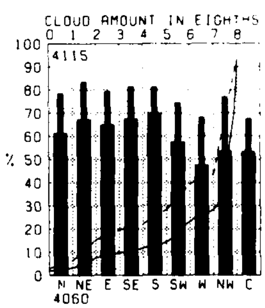
Cape Newenham



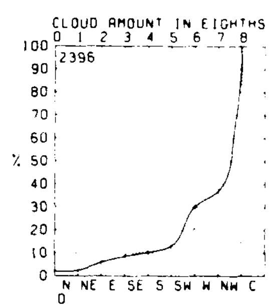
King Salmon



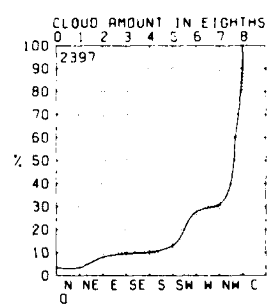
St. Paul

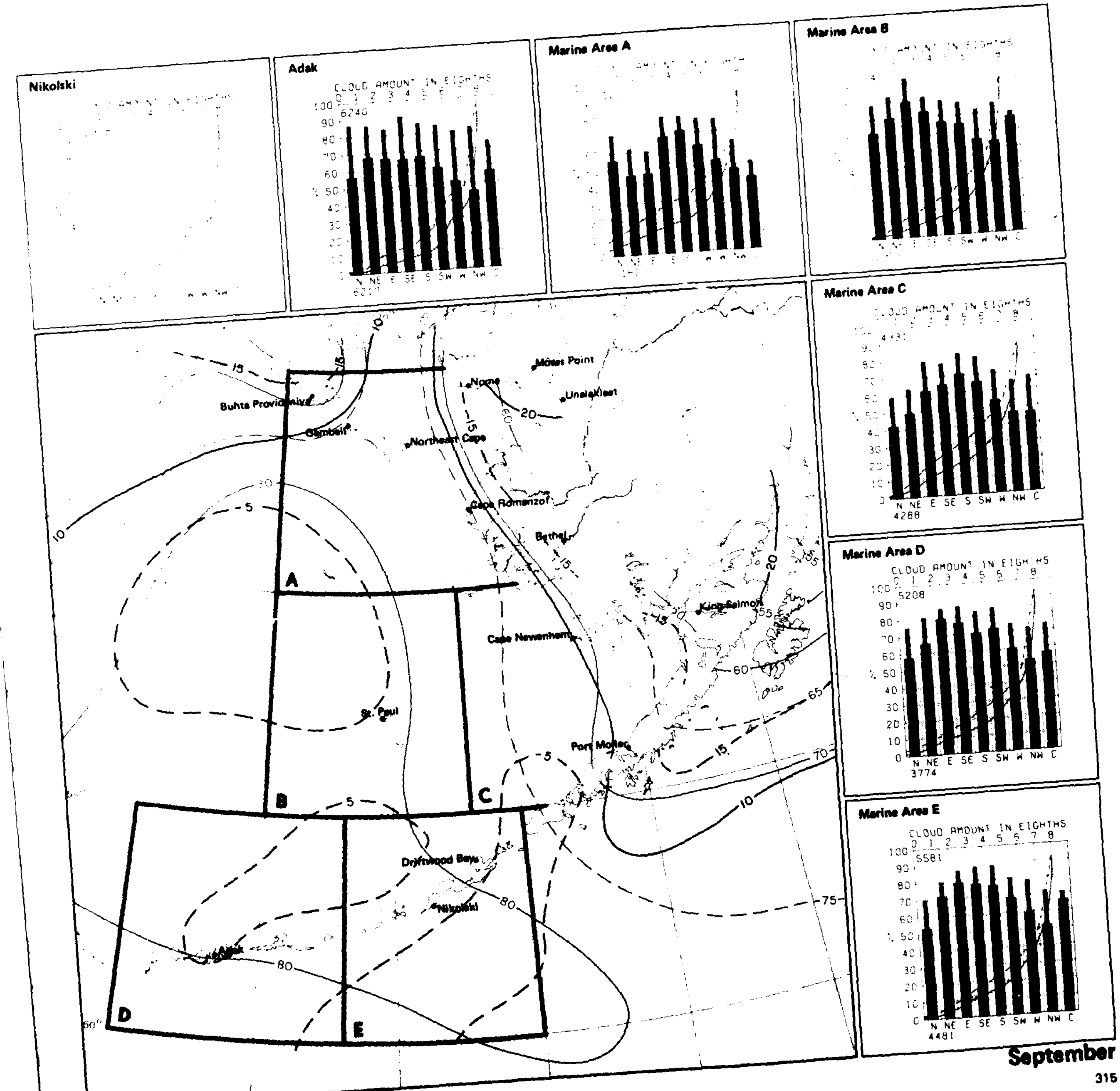


Port Moller



Driftwood Bay



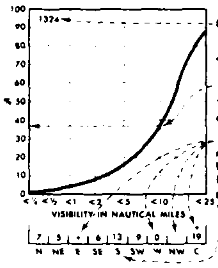


7 Cloud amount thresholds

September

Legend

Visibility/wind direction



- Number of observations
- Cumulative percent frequency of visibilities less than the visibility intersected by the curve
- (37% of all visibilities reported were <10 nautical miles)

The table below the graph indicates percent frequency of occurrence of visibility <2 nautical miles versus wind direction

• indicates < 5% but >0   0 indicates that no visibilities <2 nautical miles were observed with winds from a direction or calm. No percentage is given if less than 10 observations were available for visibility and wind direction. An asterisk indicates that the percentage was based on 10-30 observations of visibility and wind direction

(13% of all S winds were accompanied by visibilities <2 nautical miles.)

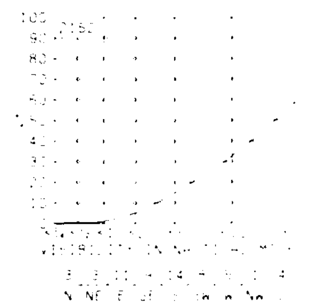
Map - Visibility thresholds

BLACK LINE   Percent frequency of visibilities ≥5 nautical miles

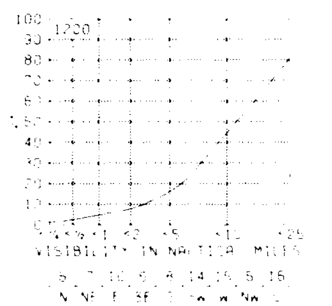
BLUE LINE   Percent frequency of visibilities <2 nautical miles

The percentage of visibility equal to or greater than a given value can be obtained from the graph by subtracting the cumulative percent frequency of that value from 100%. Visibility at sea is difficult to measure because of the lack of reference points. Also, some observers seem to report reduced visibilities at night because of darkness, though this tendency has abated in recent years. The coarseness of the coding intervals, however, tends to minimize serious biases in the summarized data. Visibilities greater than 25 nmi should be interpreted cautiously because the earth's curvature makes it impossible to see 25 nmi horizontally from the bridges of most ships

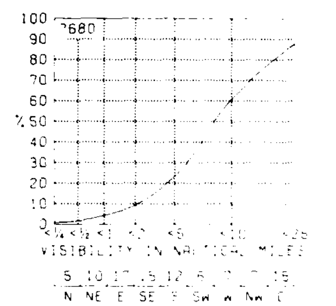
Buhta Provideniya



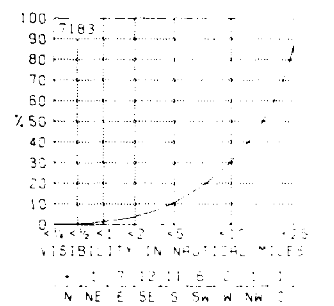
Gambell



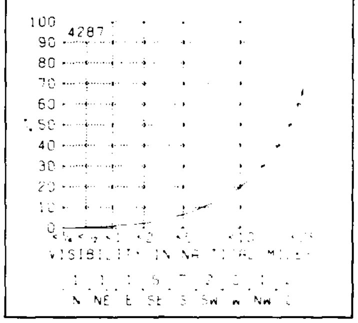
Northeast Cape



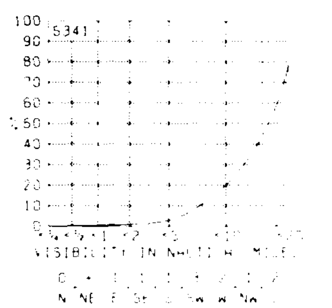
Nome



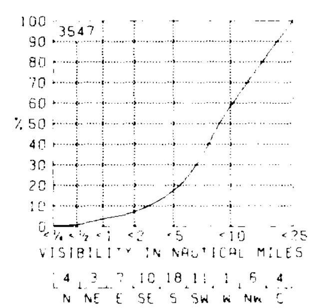
Moses Point



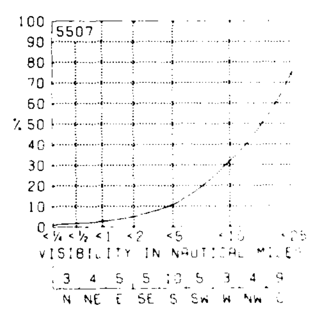
Unalakleet



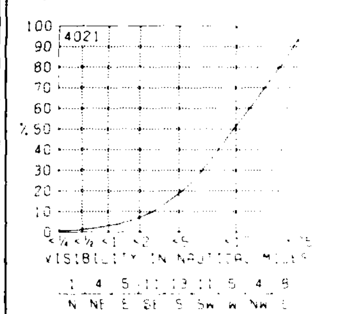
Cape Romanzof



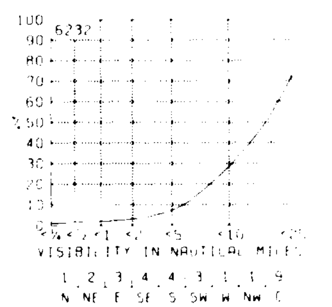
Bethel



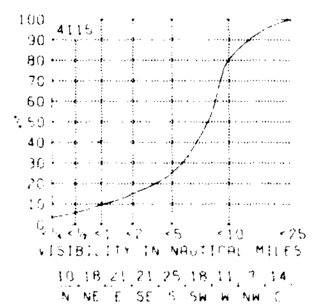
Cape Newenham



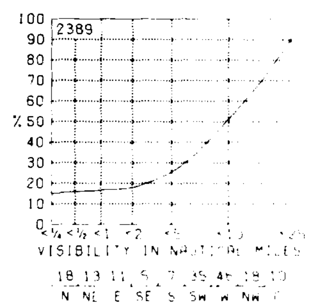
King Salmon



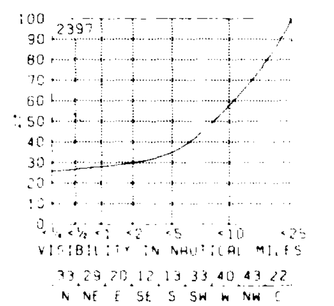
St. Paul

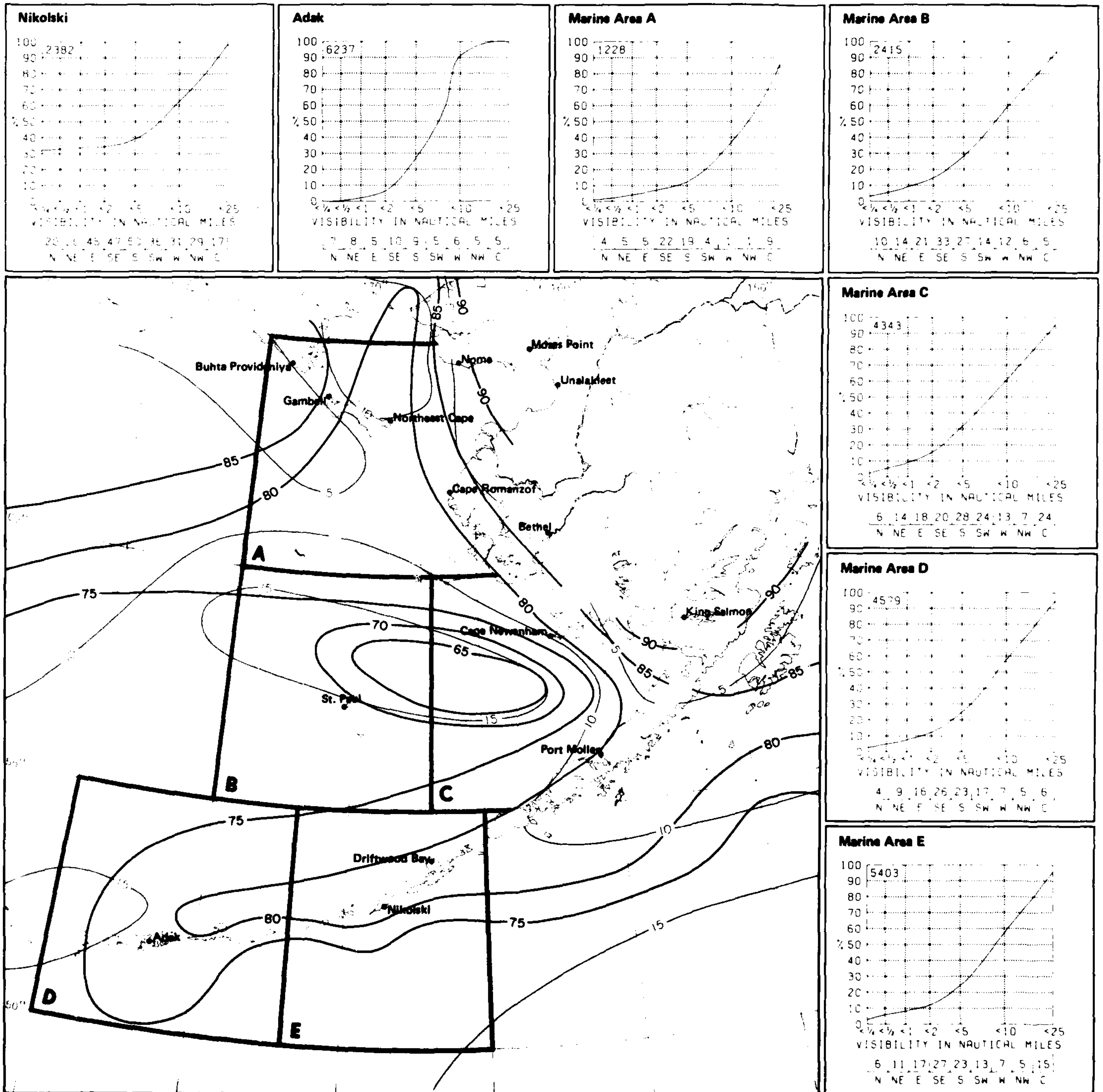


Port Moller



Driftwood Bay





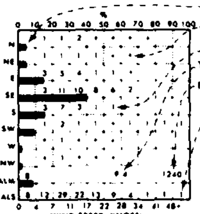
8 Visibility thresholds

September

Legend

Wind speed/direction

Direction frequency (top scale) Bars represent percent frequency of winds observed from each direction. Speed frequency (bottom scale) Printed figures represent percent frequency of wind speeds observed from each direction



(4% of all winds were from the N)

· indicates < 5% but >0

(1% of all winds were from the S with a speed 22-27 knots)

The scalar mean speed was 9.4 knots

Number of observations

(0% of winds from all directions had wind speed ≥48 knots)

WIND SPEED INTERVAL (KNOTS)

0-3	4-6	7-10	11-16	17-21	22-27	28-33	34-40	41-47	≥48
0	4	7	11	17	22	28	34	41	48+

Printed scale on bottom of chart

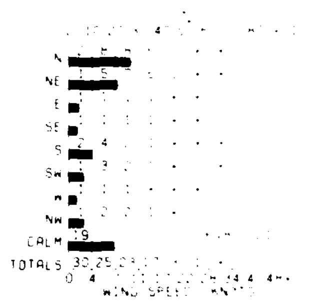
Map - Wind speed thresholds

BLACK LINE Percent frequency of wind speed ≤10 knots (≤12 mph)

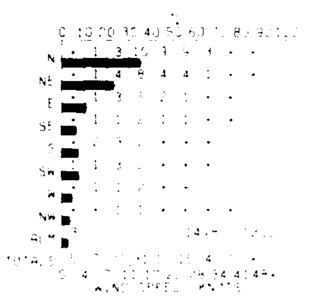
BLUE LINE Percent frequency of wind speed ≥34 knots (≥39 mph)

The scalar mean wind speed on the graph is based on the number of observations reporting a wind speed with direction. The sum of the totals line provides the cumulative percent frequency of wind speed below a selected threshold value. In the example graph, 71% of all winds were less than 17 knots (20 mph)

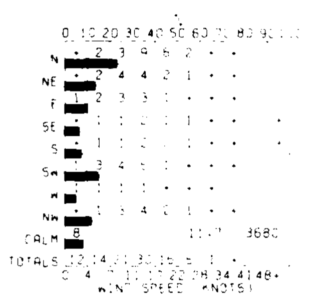
Buhta Provideniya



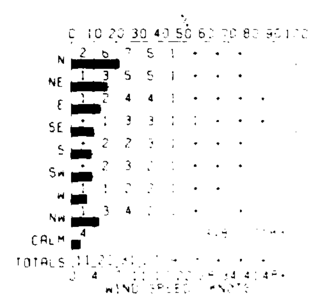
Gambell



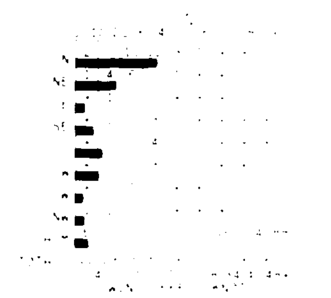
Northeast Cape



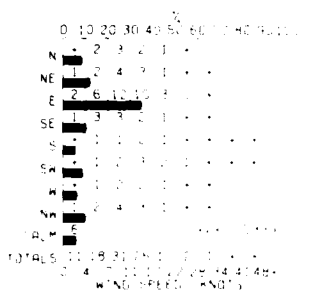
Nome



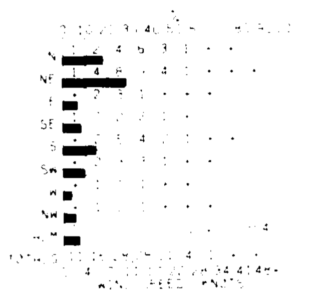
Moses Point



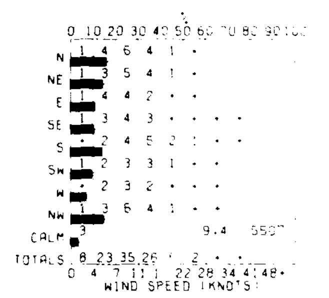
Unalakleet



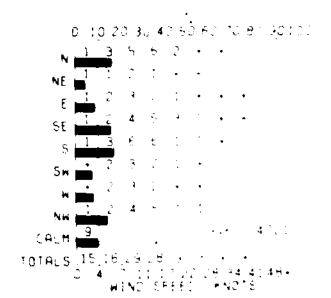
Cape Romanzof



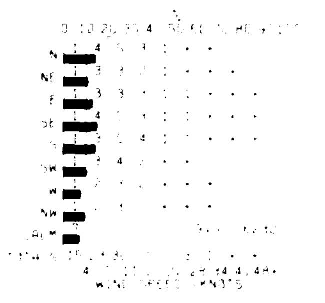
Bethel



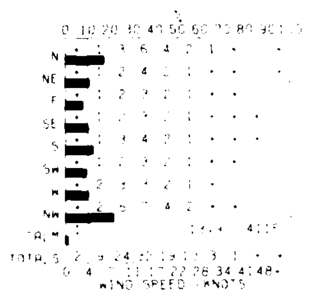
Cape Newenham



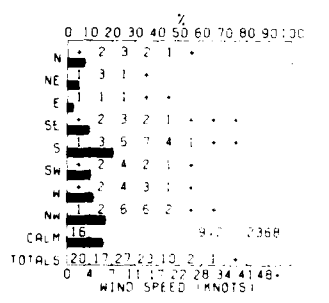
King Salmon



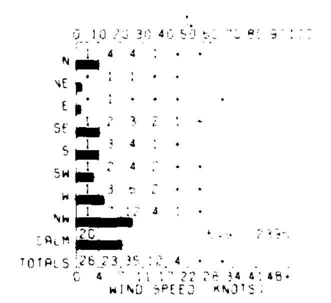
St. Paul

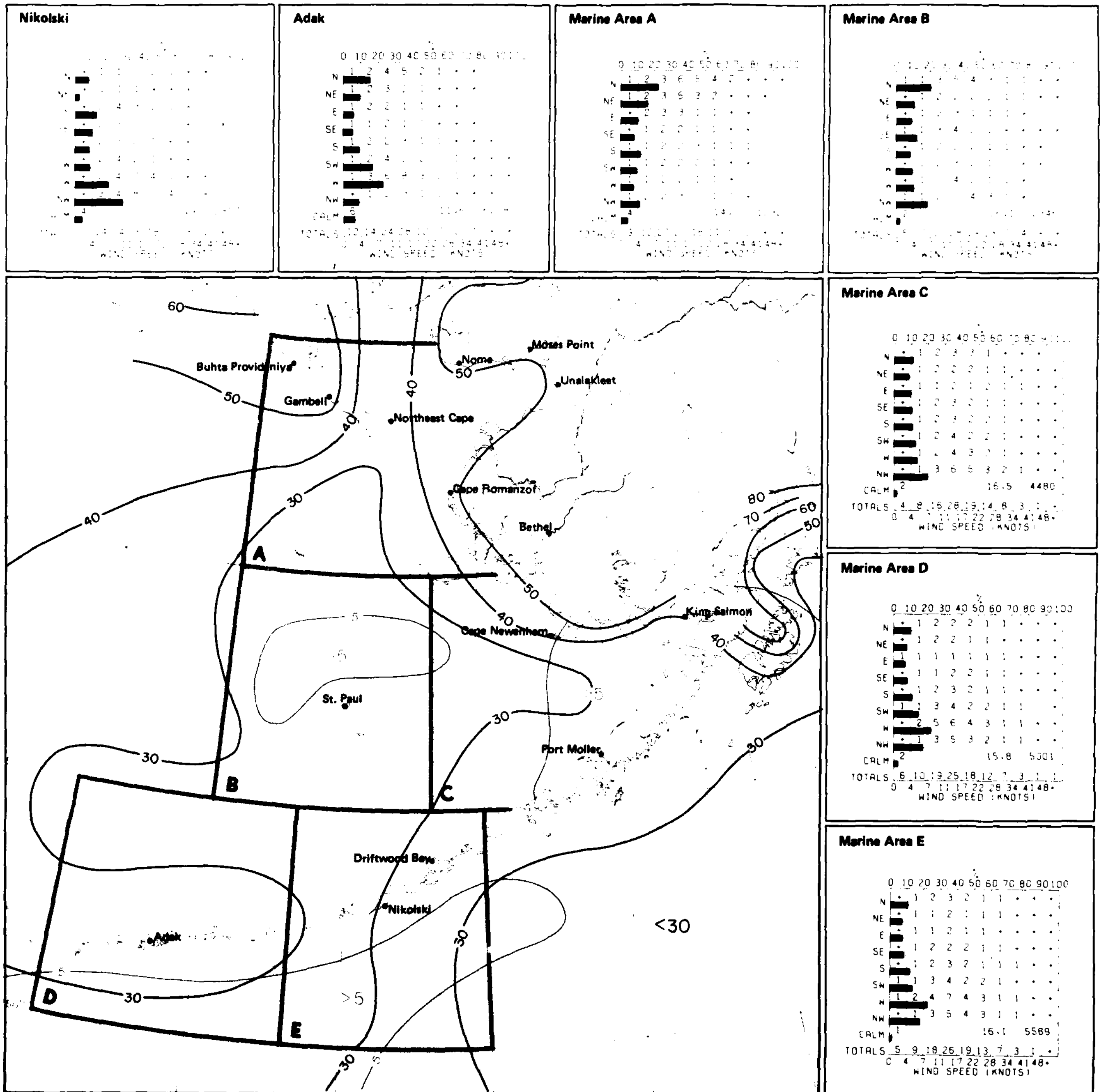


Port Moller



Driftwood Bay



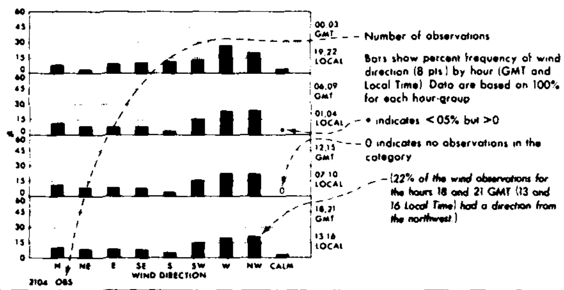


9 Wind speed thresholds

September

Legend

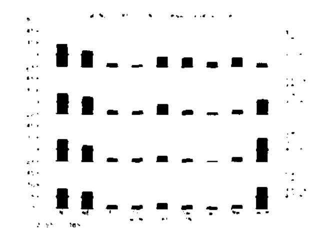
Wind direction/diurnal variation



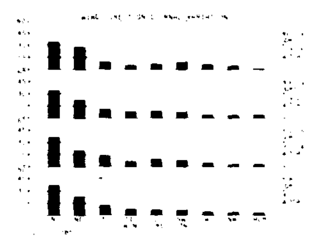
Map · Vector mean wind

10 2 Direction of flow toward station dot, vector magnitude in knots (example: vector mean wind is from northeast at 10 2 knots or 11 7 mph)

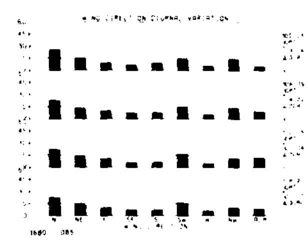
Buhta Provideniya



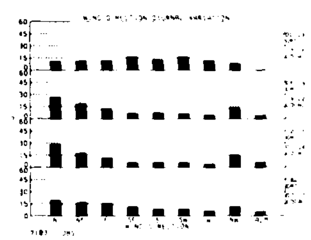
Gambell



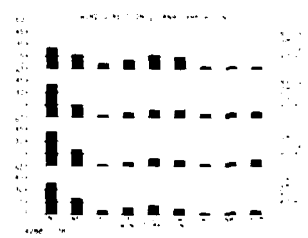
Northeast Cape



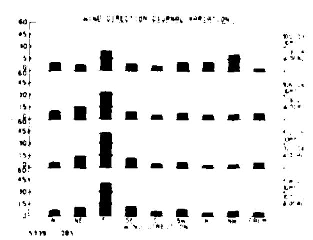
Nome



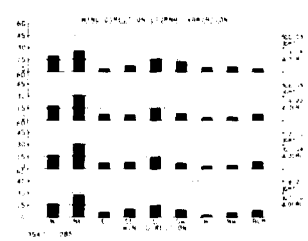
Moses Point



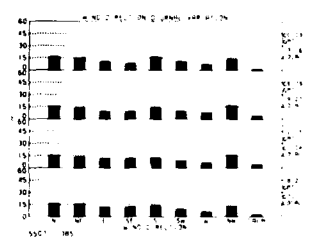
Unalakleet



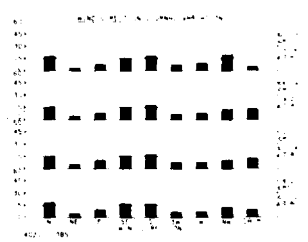
Cape Romanzof



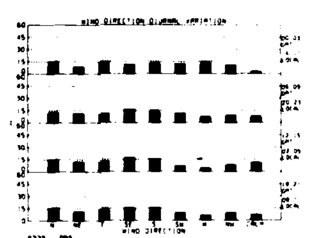
Bethel



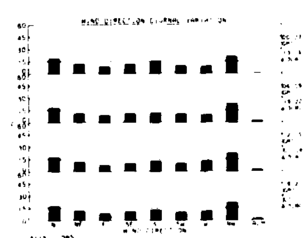
Cape Newenham



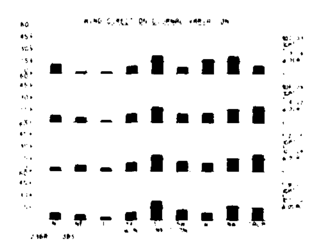
King Salmon



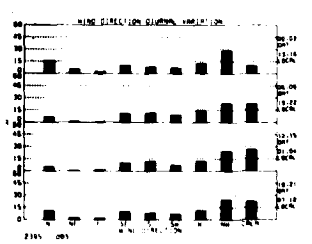
St. Paul

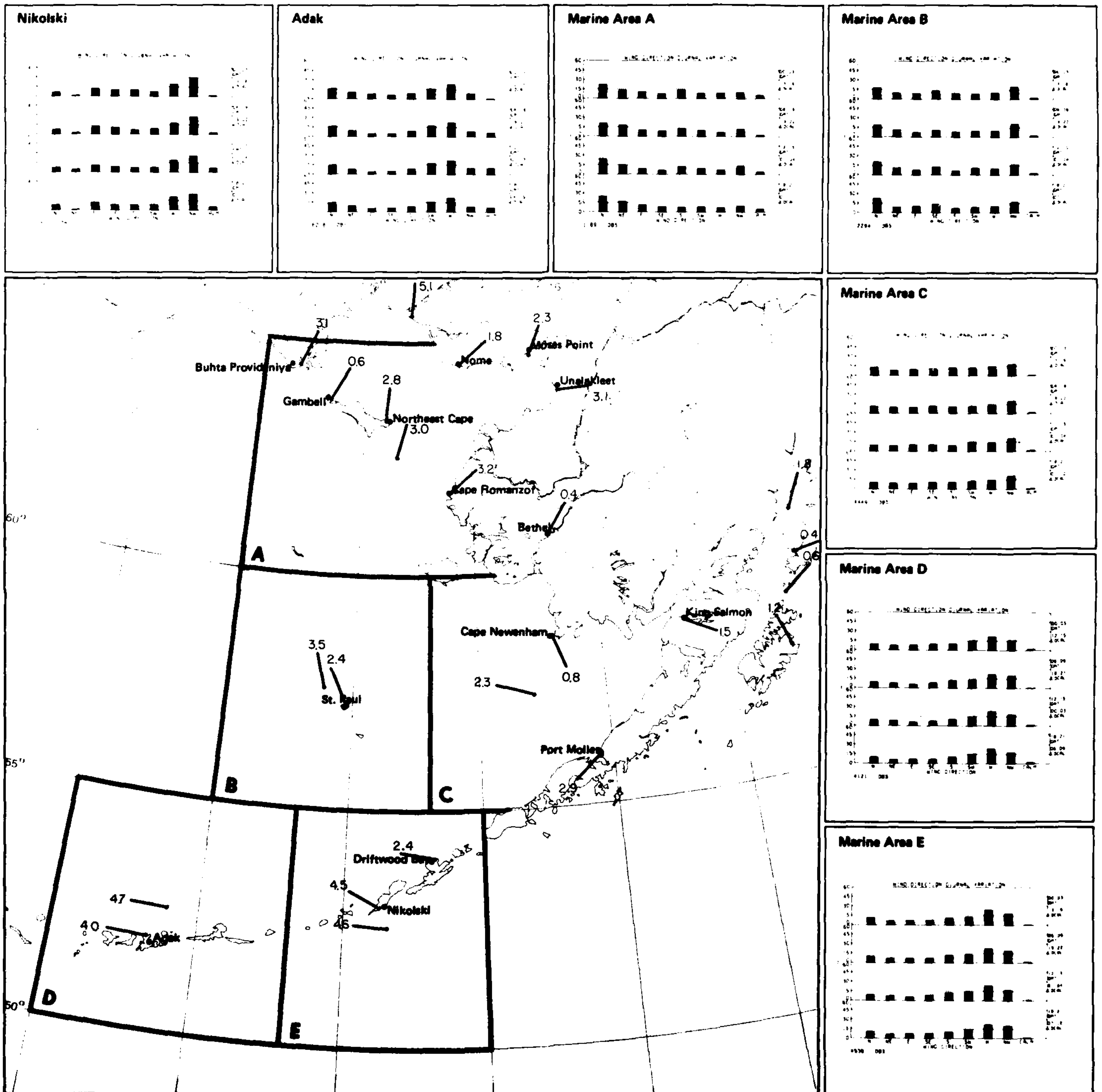


Port Moller



Driftwood Bay

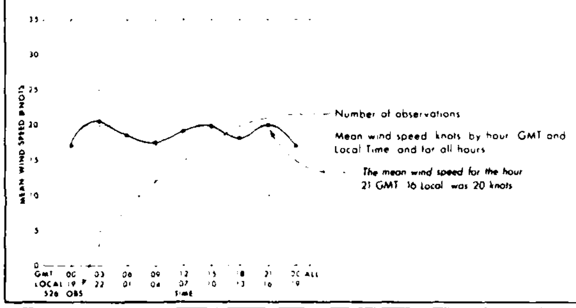




10 Vector mean wind **September**

Legend

Wind speed/diurnal variation



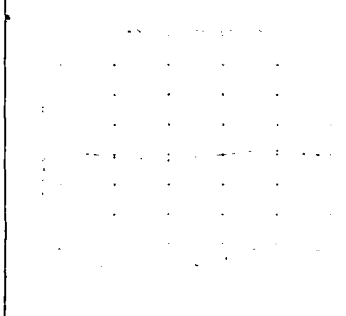
Map · Scalar mean wind

BLACK LINE Scalar mean wind knots

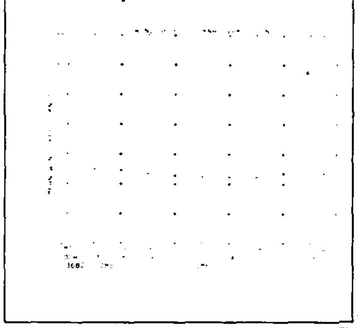
In areas of high persistence of direction the magnitude of the vector mean winds should closely approach that of the scalar mean winds. As most of the marine observations are recorded at six hour intervals, disregard the plots for other than 00 06 12 18 GMT hours on the marine area graphs.

Buhta Provideniya

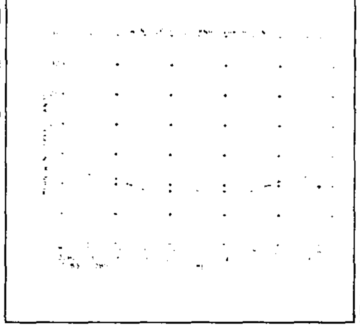
Gambell



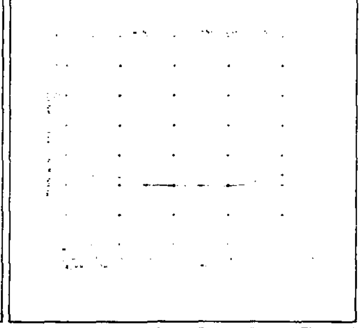
Northeast Cape



Nome

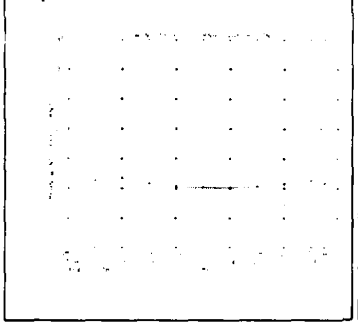


Moses Point

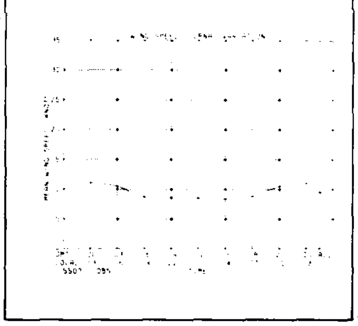


Unalakleet

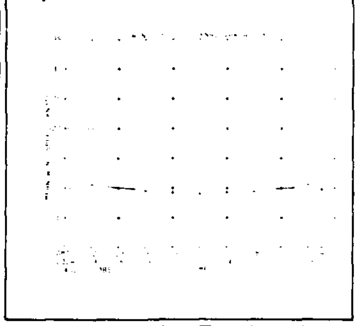
Cape Romanzof



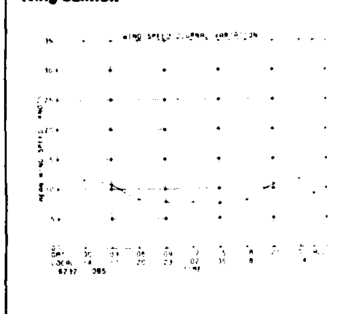
Bethel



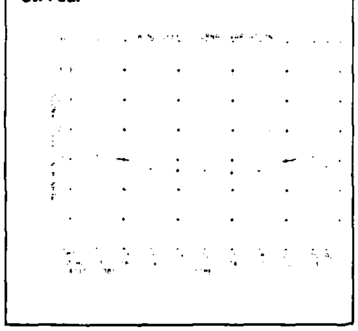
Cape Newenham



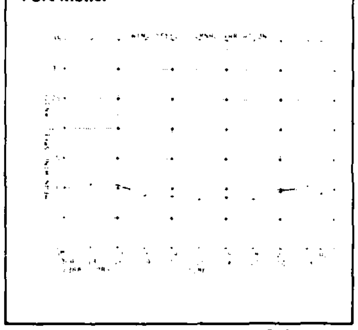
King Salmon



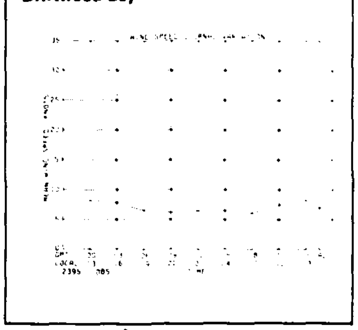
St. Paul

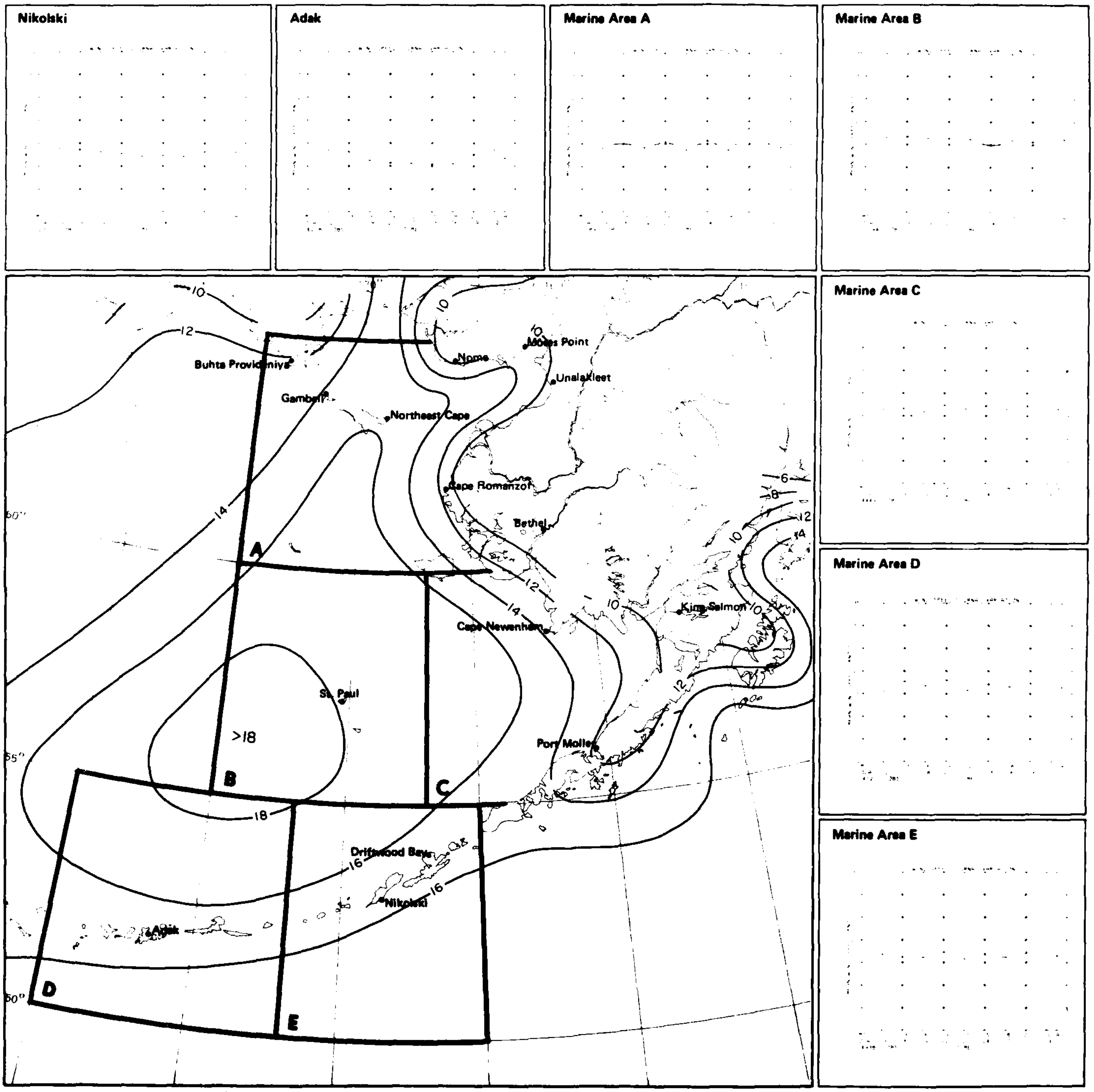


Port Moller



Driftwood Bay





11 Scalar mean wind **September**

Legend

Low cloud ceiling/visibility

VISIBILITY

LOW CLOUD CEILING

	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	0	0	•	3	13	64
50<80	0	0	0	0	•	1
35<50	0	•	0	0	0	4
20<35	0	•	1	1	2	2
10<20	0	•	1	1	2	1
6<10	0	1	0	•	•	0
3<6	•	•	0	•	•	0
1.5<3	•	0	0	0	0	0
0<1.5	•	0	0	0	0	0
						334

Percent frequency of simultaneous occurrence of specified low cloud ceilings (hundreds of feet) and visibilities (nautical miles)

Low cloud ceiling heights are estimated from the height of low clouds (h) when low cloud amount (N_h) is ≥5/8

Obscurations are included under ceiling 0<1.5

NC (no ceiling) includes bases of clouds ≥8000 feet as well as occurrences of N_h <5/8

(2% of all observations reported ceiling ≥1000 but <2000 feet simultaneously with visibility ≥5 but <10 nautical miles)

• indicates < 5% but >0

Number of observations

Map - Low cloud ceiling and visibility thresholds

BLACK LINE Percent frequency of low cloud ceiling ≥1000 feet (or no low cloud ceiling) and visibility ≥5 nautical miles

BLUE LINE Percent frequency of low cloud ceiling <600 feet and/or visibility <2 nautical miles

Buhta Provideniya

Gambell

VISIBILITY / LOW CLOUD CEILING

	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	•	[illegible]	[illegible]	•	•	[illegible]
50<80	•	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
35<50	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
20<35	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
10<20	[illegible]	•	•	[illegible]	[illegible]	[illegible]
6<10	[illegible]	•	1	4	[illegible]	•
3<6	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1.5<3	•	•	•	•	•	[illegible]
0<1.5	[illegible]	[illegible]	•	•	•	[illegible]
						1198

Northeast Cape

VISIBILITY / LOW CLOUD CEILING

	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	•	•	•	1	3	10
50<80	0	•	0	•	•	1
35<50	•	•	•	•	•	1
20<35	0	0	•	•	4	9
10<20	0	•	1	3	12	15
6<10	•	•	1	7	5	2
3<6	•	1	2	3	3	•
1.5<3	0	0	•	•	•	•
0<1.5	2	1	1	•	•	0
						2480

Nome

VISIBILITY / LOW CLOUD CEILING

	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	0	0	•	•	3	45
50<80	0	0	0	•	•	3
35<50	0	0	0	•	1	4
20<35	0	0	•	•	3	9
10<20	0	•	•	2	7	7
6<10	•	•	1	3	4	1
3<6	•	•	1	1	1	•
1.5<3	0	•	•	•	•	0
0<1.5	•	•	•	•	0	0
						6983

Moses Point

VISIBILITY / LOW CLOUD CEILING

	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	0	0	0	[illegible]	[illegible]	41
50<80	0	0	0	[illegible]	•	1
35<50	0	0	0	•	[illegible]	[illegible]
20<35	0	0	[illegible]	1	[illegible]	•
10<20	0	•	1	2	4	1
6<10	0	•	0	•	0	•
3<6	0	•	0	0	0	0
1.5<3	0	0	0	0	0	0
0<1.5	•	1	0	1	1	0
						244

Unalakleet

Cape Romanzof

VISIBILITY / LOW CLOUD CEILING

	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	•	•	•	1	[illegible]	14
50<80	0	•	1	0	1	2
35<50	0	0	0	0	1	1
20<35	0	•	•	•	7	6
10<20	0	•	•	2	18	9
6<10	•	•	2	5	1	9
3<6	•	1	1	3	2	•
1.5<3	0	•	0	•	0	0
0<1.5	1	1	•	•	0	0
						2445

Bethel

VISIBILITY / LOW CLOUD CEILING

	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	1	•	•	1	4	36
50<80	•	•	•	•	1	4
35<50	•	0	•	•	2	5
20<35	•	•	•	1	4	12
10<20	•	•	•	1	5	8
6<10	•	•	1	2	4	2
3<6	•	•	1	1	1	1
1.5<3	0	•	•	•	•	•
0<1.5	1	•	•	•	•	0
						5481

Cape Newenham

VISIBILITY / LOW CLOUD CEILING

	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	•	•	•	•	4	14
50<80	0	0	0	0	•	1
35<50	0	0	0	•	1	2
20<35	0	•	0	•	7	8
10<20	•	•	•	3	10	11
6<10	•	•	1	5	8	6
3<6	•	•	1	3	2	1
1.5<3	0	•	•	•	•	•
0<1.5	2	1	1	•	0	0
						2503

King Salmon

VISIBILITY / LOW CLOUD CEILING

	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	1	•	•	1	6	[illegible]
50<80	•	[illegible]	0	•	•	[illegible]
35<50	•	0	0	•	2	[illegible]
20<35	•	0	•	1	4	11
10<20	•	•	•	1	4	5
6<10	•	•	•	1	2	1
3<6	•	•	•	1	1	1
1.5<3	0	•	•	•	•	0
0<1.5	•	•	•	•	•	0
						6154

St. Paul

VISIBILITY / LOW CLOUD CEILING

	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	•	•	•	1	14	8
50<80	•	•	0	•	•	•
35<50	•	0	0	0	2	2
20<35	0	0	•	•	9	4
10<20	•	•	•	2	17	4
6<10	0	•	1	3	8	1
3<6	1	1	3	4	3	1
1.5<3	•	1	1	•	•	0
0<1.5	5	1	•	•	•	0
						4060

Port Moller

Insufficient Data

Driftwood Bay

Insufficient Data

Nikolski

Insufficient Data

Adak

LOW CLOUD CEILING / VISIBILITY

	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	·	·	·	1	11	4
50<80	0	0	0	0	·	·
35<50	0	0	0	·	2	1
20<35	[illegible]	·	·	1	16	2
10<20	[illegible]	·	·	6	23	1
6<10	·	·	1	7	9	·
3<6	·	1	1	5	3	·
1.5<3	0	·	·	·	·	0
0<1.5	·	1	1	·	·	0

6214

Marine Area A

Marine Area B

Marine Area C

Marine Area D

LOW CLOUD CEILING / VISIBILITY

	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	·	·	·	1	4	[illegible]
50<80	[illegible]	[illegible]	[illegible]	[illegible]	·	[illegible]
35<50	[illegible]	[illegible]	[illegible]	·	[illegible]	[illegible]
20<35	·	·	·	[illegible]	[illegible]	[illegible]
10<20	·	·	[illegible]	[illegible]	[illegible]	[illegible]
6<10	·	·	[illegible]	4	[illegible]	[illegible]
3<6	·	·	[illegible]	[illegible]	[illegible]	[illegible]
1.5<3	·	·	·	·	·	·
0<1.5	4	1	2	1	1	·

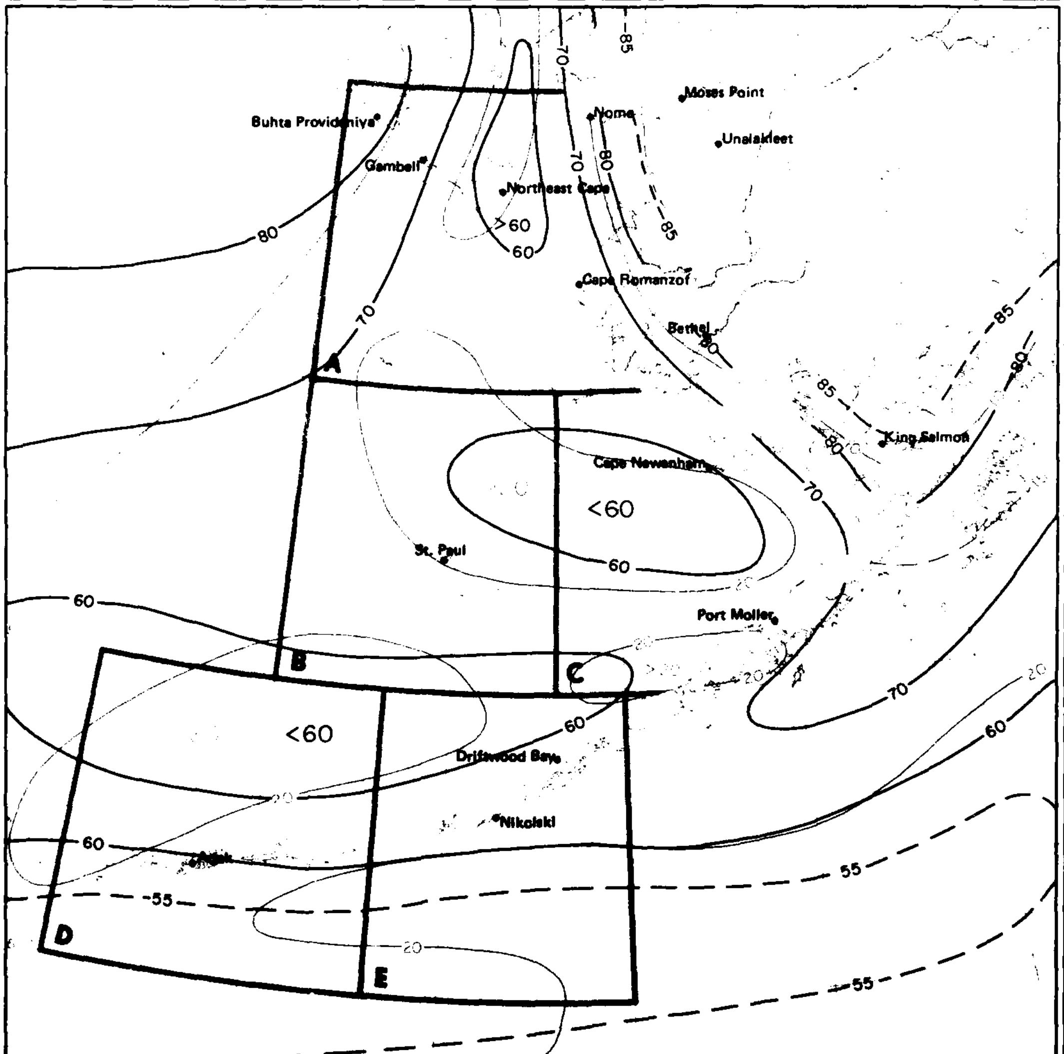
3499

Marine Area E

LOW CLOUD CEILING / VISIBILITY

	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	·	0	·	1	5	15
50<80	0	0	·	·	·	1
35<50	·	0	0	·	1	2
20<35	·	·	·	1	4	8
10<20	·	·	1	4	10	12
6<10	·	1	1	4	8	6
3<6	·	·	·	1	1	1
1.5<3	·	·	·	·	·	·
0<1.5	5	1	1	1	1	·

4199

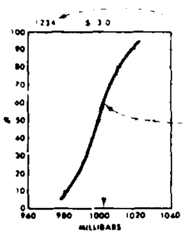


12 Low cloud ceiling and visibility thresholds

September

Legend

Sea level pressure



Number of observations

Cumulative percent frequency of sea level pressures equal to or less than the pressure intersected by the curve

S Standard deviation of pressure mbs

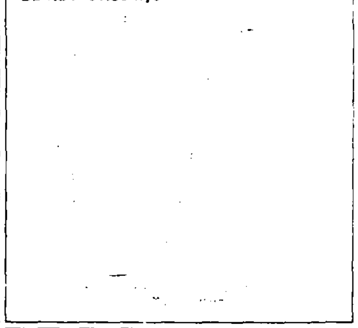
60% of all observed sea level pressures were ≤1002 millibars

Map - Mean sea level pressure

BLACK LINE Mean sea level pressure millibars

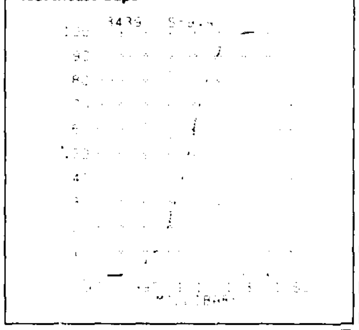
Sea level pressure is one of the most frequently recorded elements but one of the least accurate because of instrument and coding errors. Despite the inaccuracies of the individual readings, however the large scale patterns and mean gradients of the isopleth analyses are relatively accurate.

Buhta Provideniya

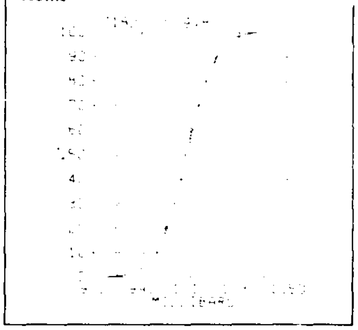


Gambell

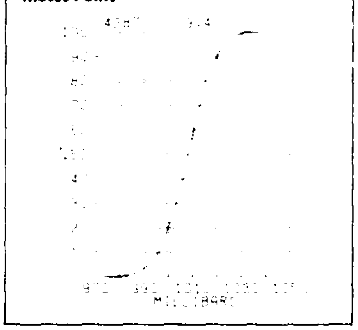
Northeast Cape



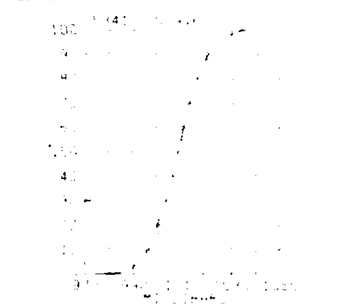
Nome



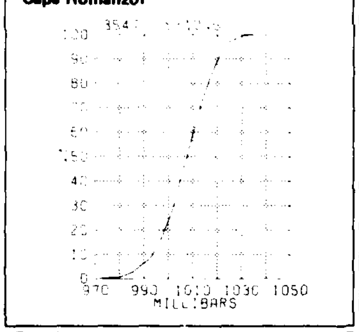
Moses Point



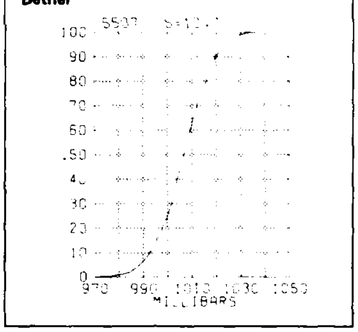
Unalakleet



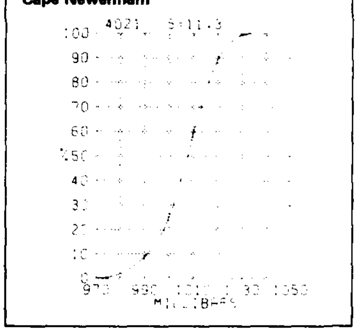
Cape Romanzof



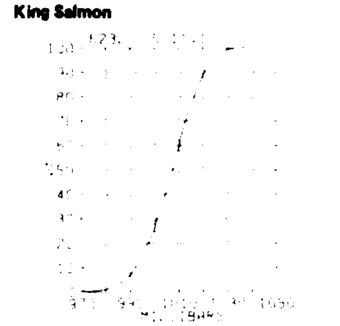
Bethel



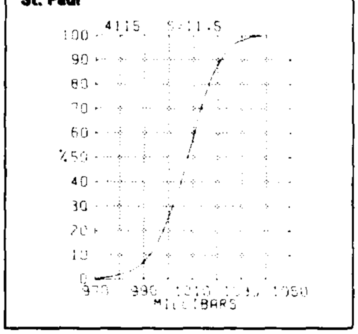
Cape Newenham



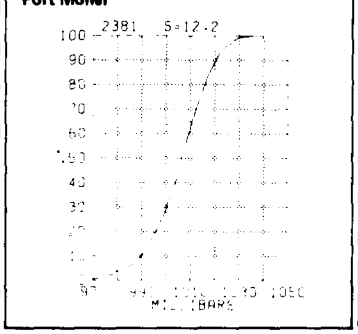
King Salmon



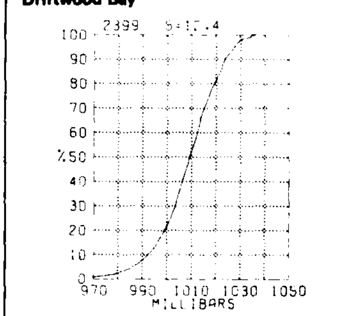
St. Paul

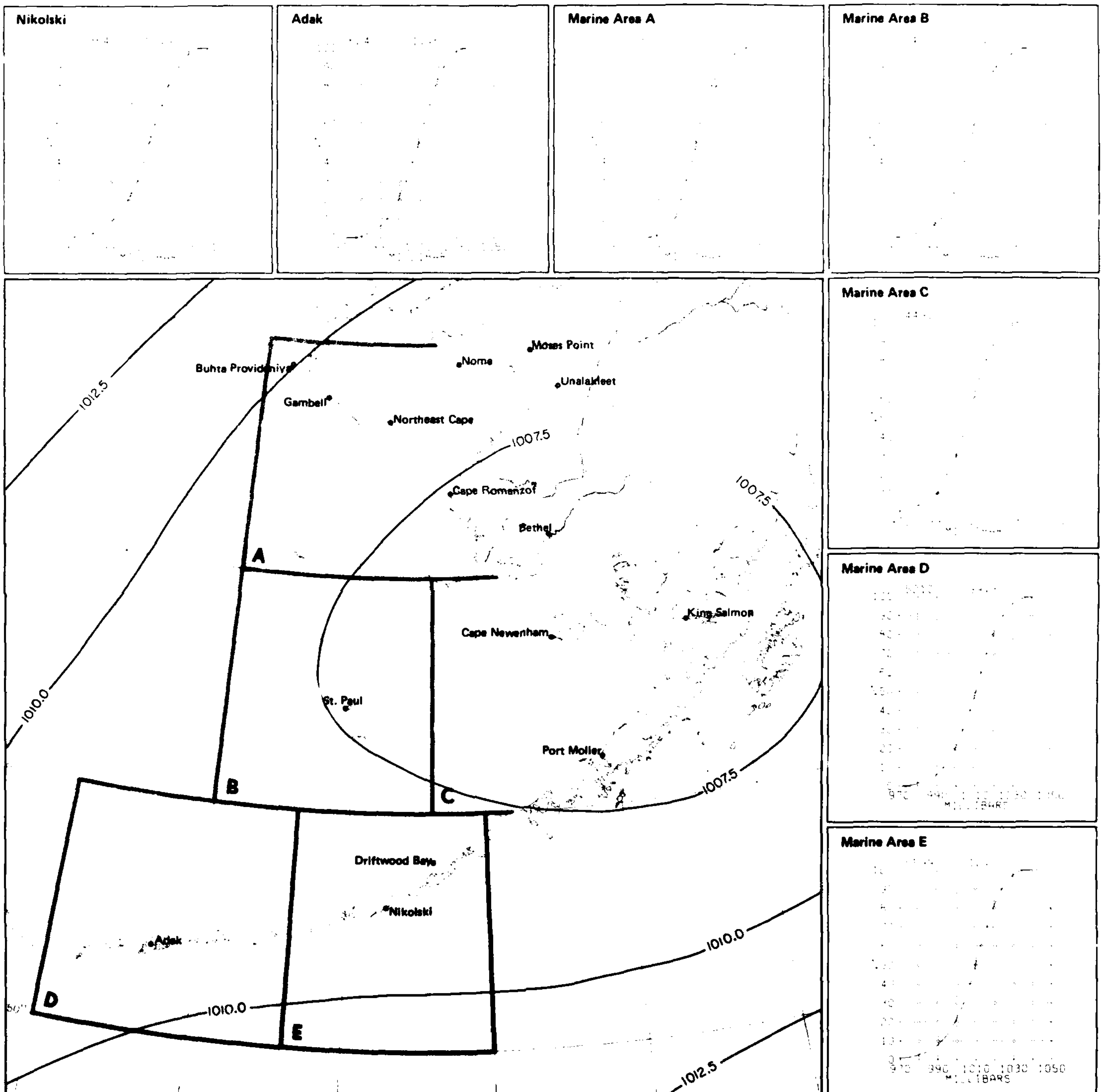


Port Moller



Driftwood Bay

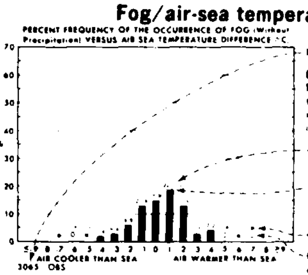




13 Mean sea level pressure **September**

Legend

Fog/air-sea temperature difference



Number of observations

Bars show the percentage of observations with Fog without Precipitation for each Air Sea temperature difference category. Plotted numbers indicate the percentage of observations in each Air Sea temperature difference category

22.7% of all observations had Air Sea temperature difference of -1 °C

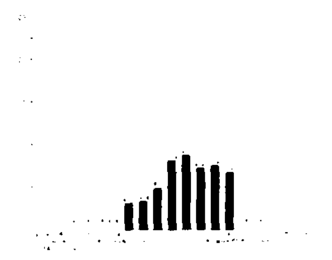
19% of all observations with Air Sea temperature difference of -1 °C were accompanied by Fog without Precipitation

• indicates < 0.5% but > 0

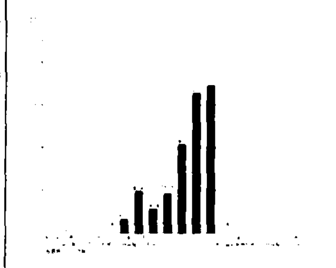
0 indicates no fog with the Air Sea temperature difference category

BLACK LINE Mean sea surface temperature (°C)

Marine Area A

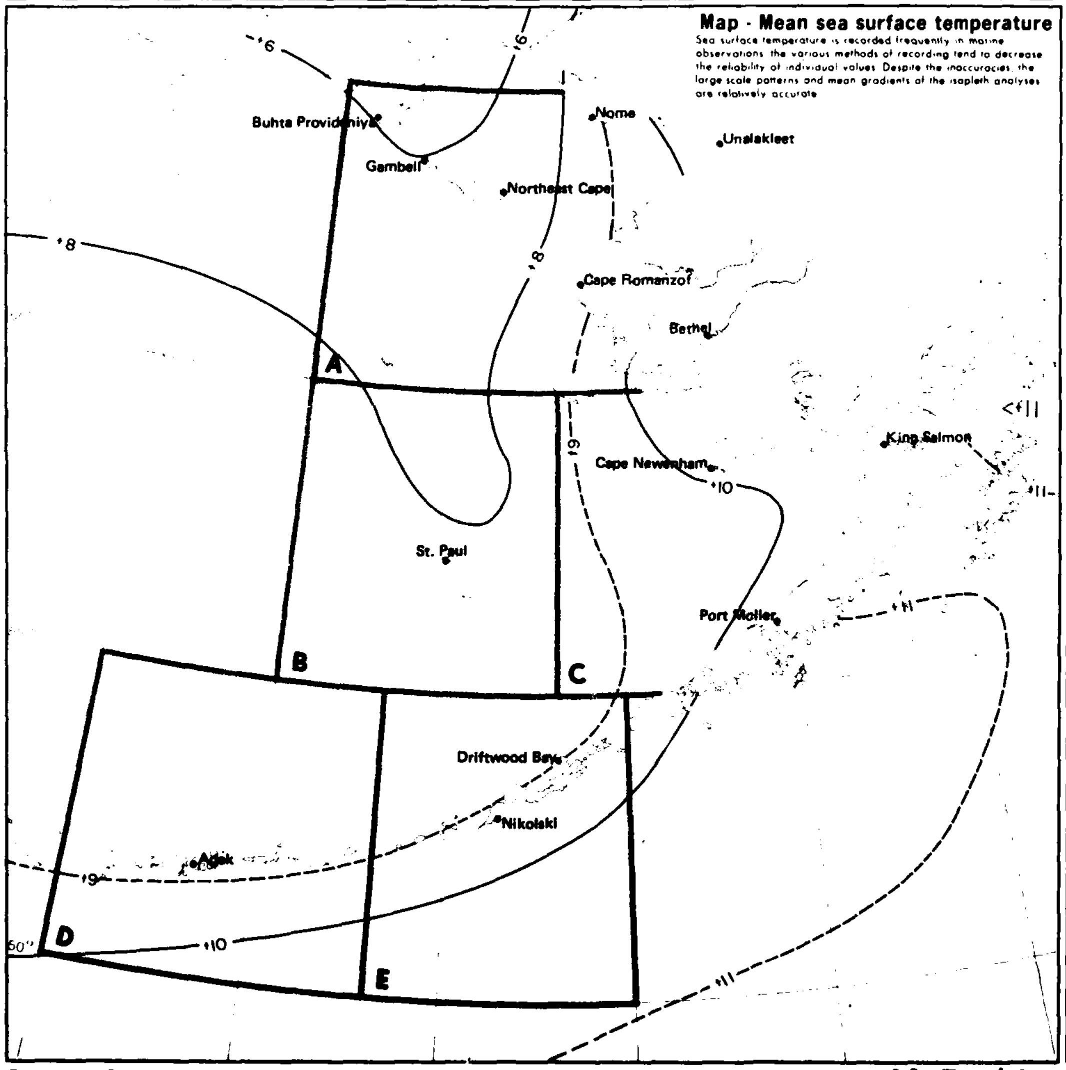


Marine Area B

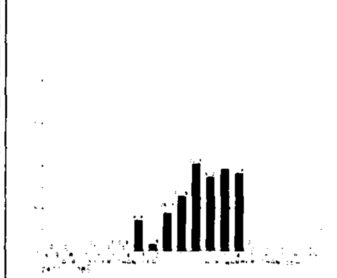


Map - Mean sea surface temperature

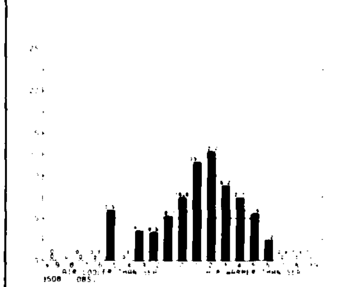
Sea surface temperature is recorded frequently in marine observations the various methods of recording tend to decrease the reliability of individual values. Despite the inaccuracies, the large scale patterns and mean gradients of the isopleth analyses are relatively accurate



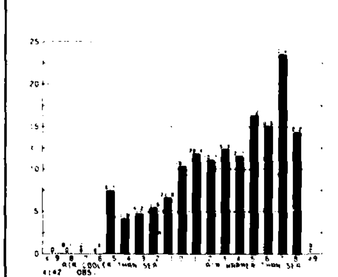
Marine Area C



Marine Area D



Marine Area E

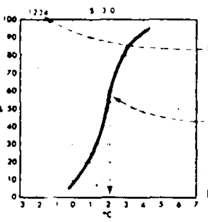


September

14 Fog/air-sea temperature difference
Mean sea surface temperature

Legend

Sea surface temperature



Number of observations

Cumulative percent frequency of sea surface temperatures equal to or less than the temperature intersected by the curve

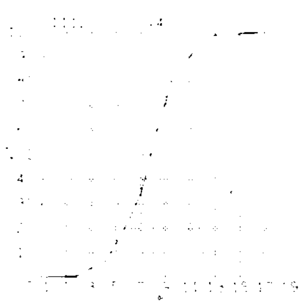
(60% of all observed sea surface temperatures were ≤2.1°C or ≤35.8°F)

S Standard deviation of sea surface temperatures (°C)

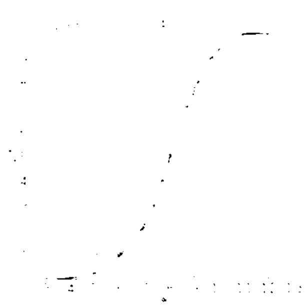
BLACK LINE Maximum (99%) sea surface temperature (°C) (1% of the temperatures were greater than the given value)

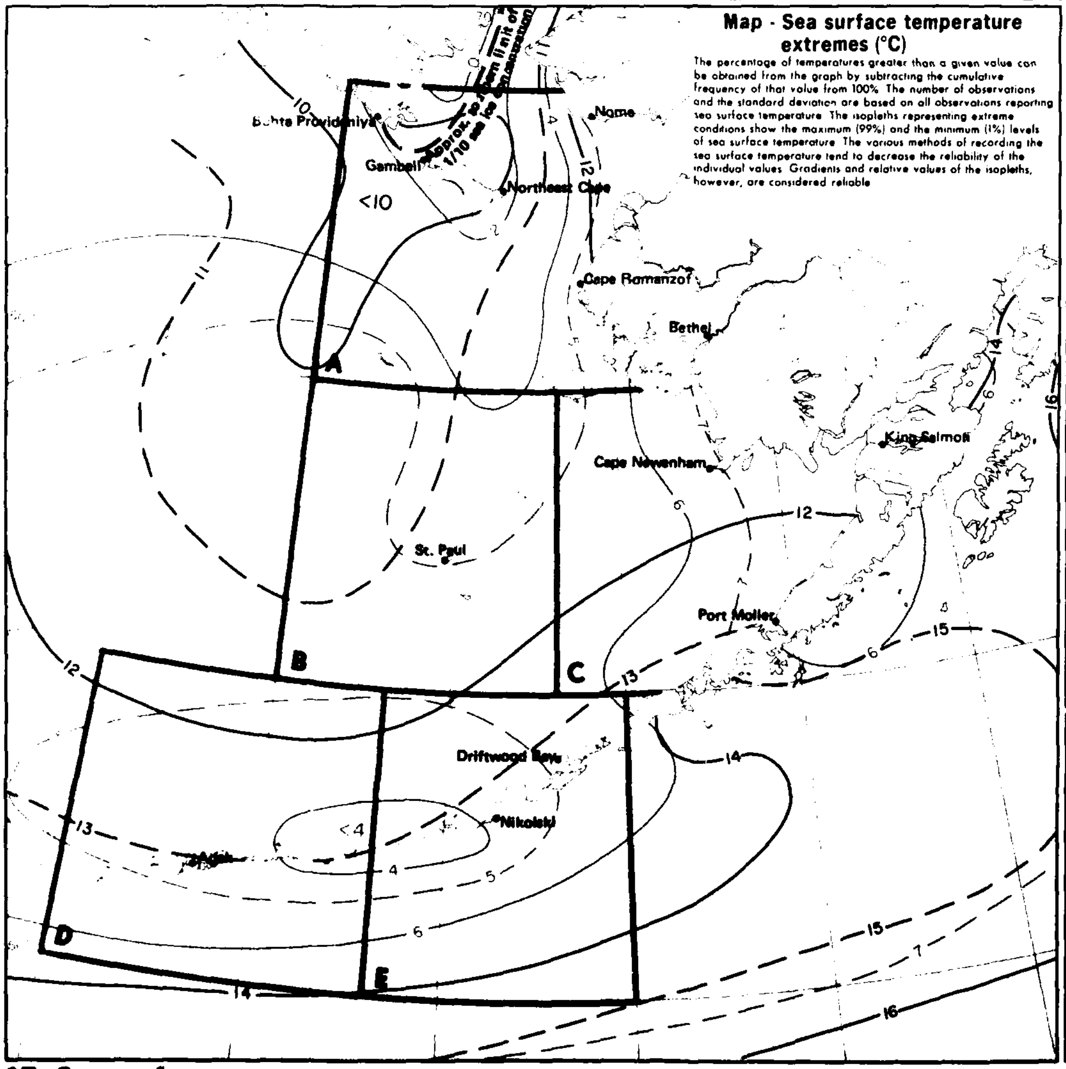
BLUE LINE Minimum (1%) sea surface temperature (°C) (1% of the temperatures were equal to or less than the given value)

Marine Area A



Marine Area B

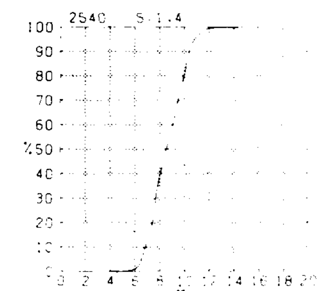




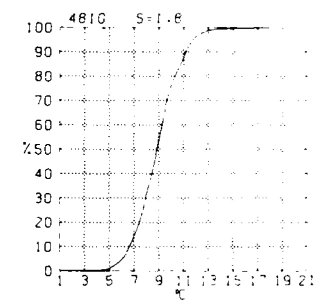
Map - Sea surface temperature extremes (°C)

The percentage of temperatures greater than a given value can be obtained from the graph by subtracting the cumulative frequency of that value from 100%. The number of observations and the standard deviation are based on all observations reporting sea surface temperature. The isopleths representing extreme conditions show the maximum (99%) and the minimum (1%) levels of sea surface temperature. The various methods of recording the sea surface temperature tend to decrease the reliability of the individual values. Gradients and relative values of the isopleths, however, are considered reliable.

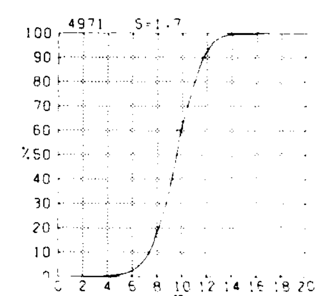
Marine Area C



Marine Area D



Marine Area E



15 Sea surface temperature extremes

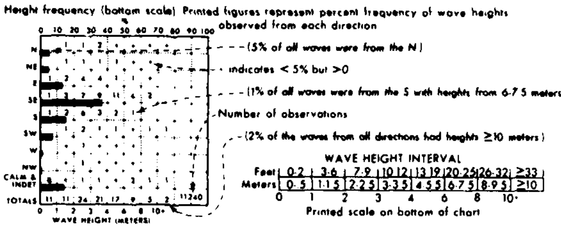
September

Legend

Wave height/direction

Direction frequency (top scale) Bars represent percent frequency of waves from each direction

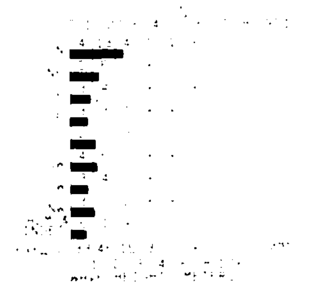
Height frequency (bottom scale) Printed figures represent percent frequency of wave heights observed from each direction



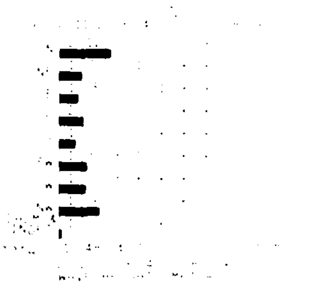
BLACK LINE · *Percent frequency of wave height <1 5 meters (<5 feet)*

BLUE LINE · Percent frequency of wave height <2 5 meters (<8 feet)

Marine Area A

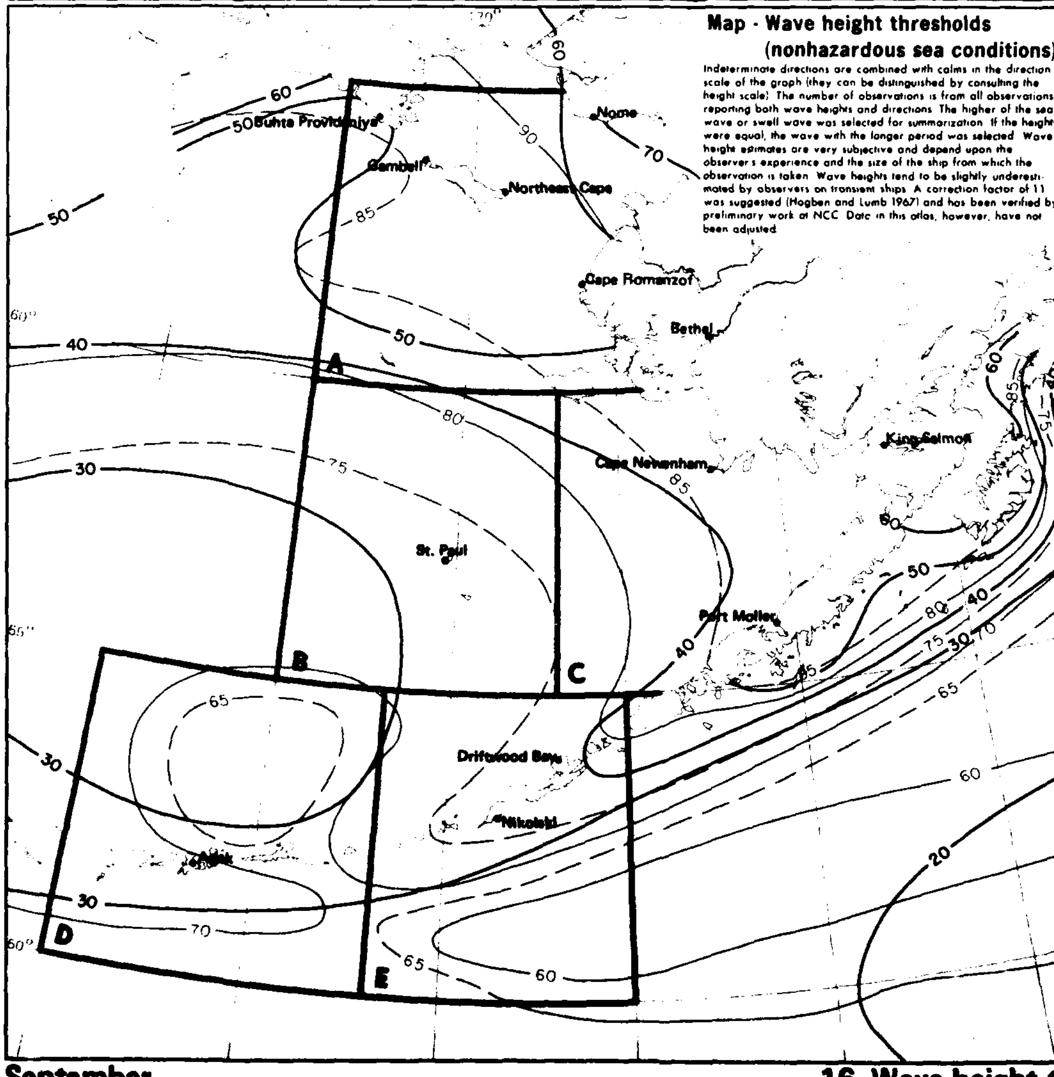


Marine Area B

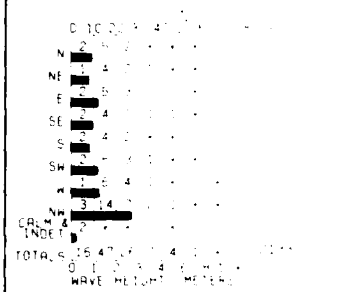


Map · Wave height thresholds (nonhazardous sea conditions)

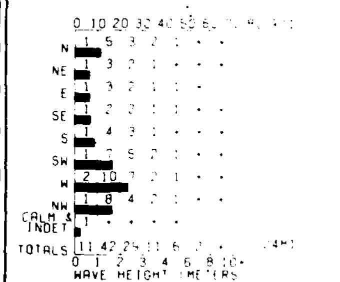
Indeterminate directions are combined with calms in the direction scale of the graph (they can be distinguished by consulting the height scale) The number of observations is from all observations reporting both wave heights and directions The higher of the sea wave or swell wave was selected for summarization If the heights were equal, the wave with the longer period was selected Wave height estimates are very subjective and depend upon the observer's experience and the size of the ship from which the observation is taken Wave heights tend to be slightly underestimated by observers on transient ships A correction factor of 11 was suggested (Hogben and Lumb 1967) and has been verified by preliminary work at NCC Data in this atlas, however, have not been adjusted



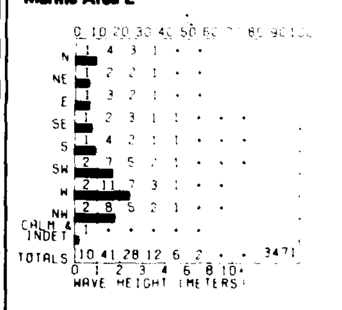
Marine Area C



Marine Area D



Marine Area E



Legend

Wave height/period

PERIOD (Seconds)

[illegible]	21	3	1	+	+	+	6
[illegible]	22	16	6	2	1	+	+
[illegible]	3	6	4	3	1	+	+
[illegible]	+	1	1	1	1	+	+
[illegible]	+	+	+	+	+	+	0
[illegible]	0	+	+	0	0	+	0
[illegible]	0	0	0	+	0	0	0
[illegible]	0	0	0	0	0	+	0
							4010

Percent frequency of occurrence of wave period and height

(2% of observed waves had a height of 1-1.5 meters and a period of 10-11 seconds.)

\+ indicates < 5% but >0

—Number of observations

Waves are selected on the basis of the higher of sea and swell when both are reported. If both heights are equal, the wave with the longer period is selected.

BLACK LINE Percent frequency of wave height ≥3.5 meters (≥12 feet)

BLUE LINE Percent frequency of wave height ≥6 meters (≥20 feet)

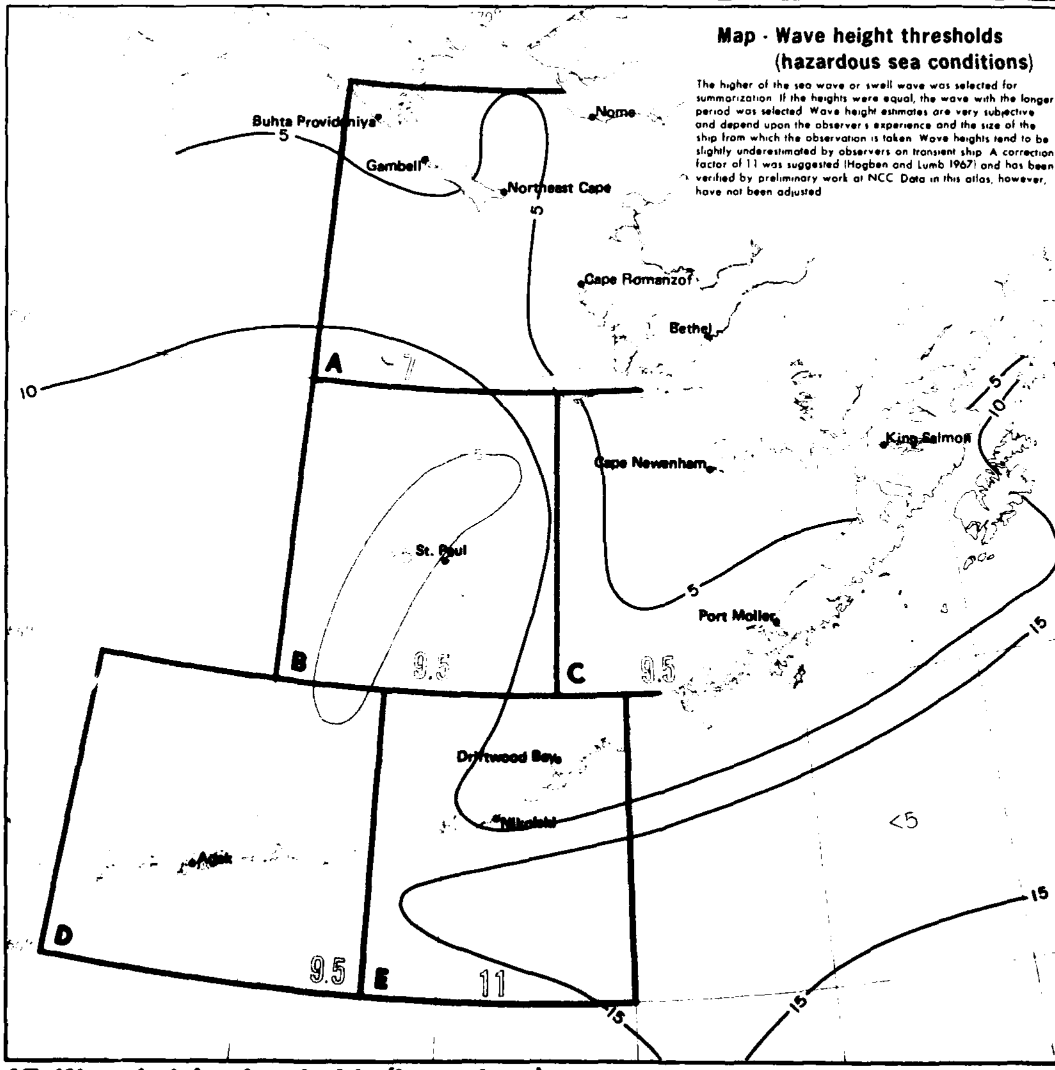
BLUE NUMBER Maximum observed wave height (meters)

Marine Area A

Marine Area B

Map - Wave height thresholds (hazardous sea conditions)

The higher of the sea wave or swell wave was selected for summarization. If the heights were equal, the wave with the longer period was selected. Wave height estimates are very subjective and depend upon the observer's experience and the size of the ship from which the observation is taken. Wave heights tend to be slightly underestimated by observers on transient ship. A correction factor of 1.1 was suggested (Hogben and Lumb 1967) and has been verified by preliminary work at NCC. Data in this atlas, however, have not been adjusted.



Marine Area C

HEIGHT (MTRS)	<6	6-7	8-9	10-11	12-13	>13	IND
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
6-7.5	0	0	+	+	+	[illegible]	[illegible]
8-9.5	0	0	+	+	0	[illegible]	[illegible]
≥10	0	0	0	0	0	0	0
							2173

Marine Area D

PERIOD (SECONDS)

HEIGHT (MTRS)	<6	6-7	8-9	10-11	12-13	>13	IND
0-.5	8	1	+	+	[illegible]	0	3
1-1.5	18	16	4	1	1	+	[illegible]
2-2.5	5	10	9	3	1	+	1
3-3.5	1	4	3	2	1	+	+
4-5.5	+	2	2	1	+	+	+
6-7.5	0	+	1	+	+	+	+
8-9.5	0	+	+	+	0	+	+
≥10	0	0	0	0	0	0	0
							2527

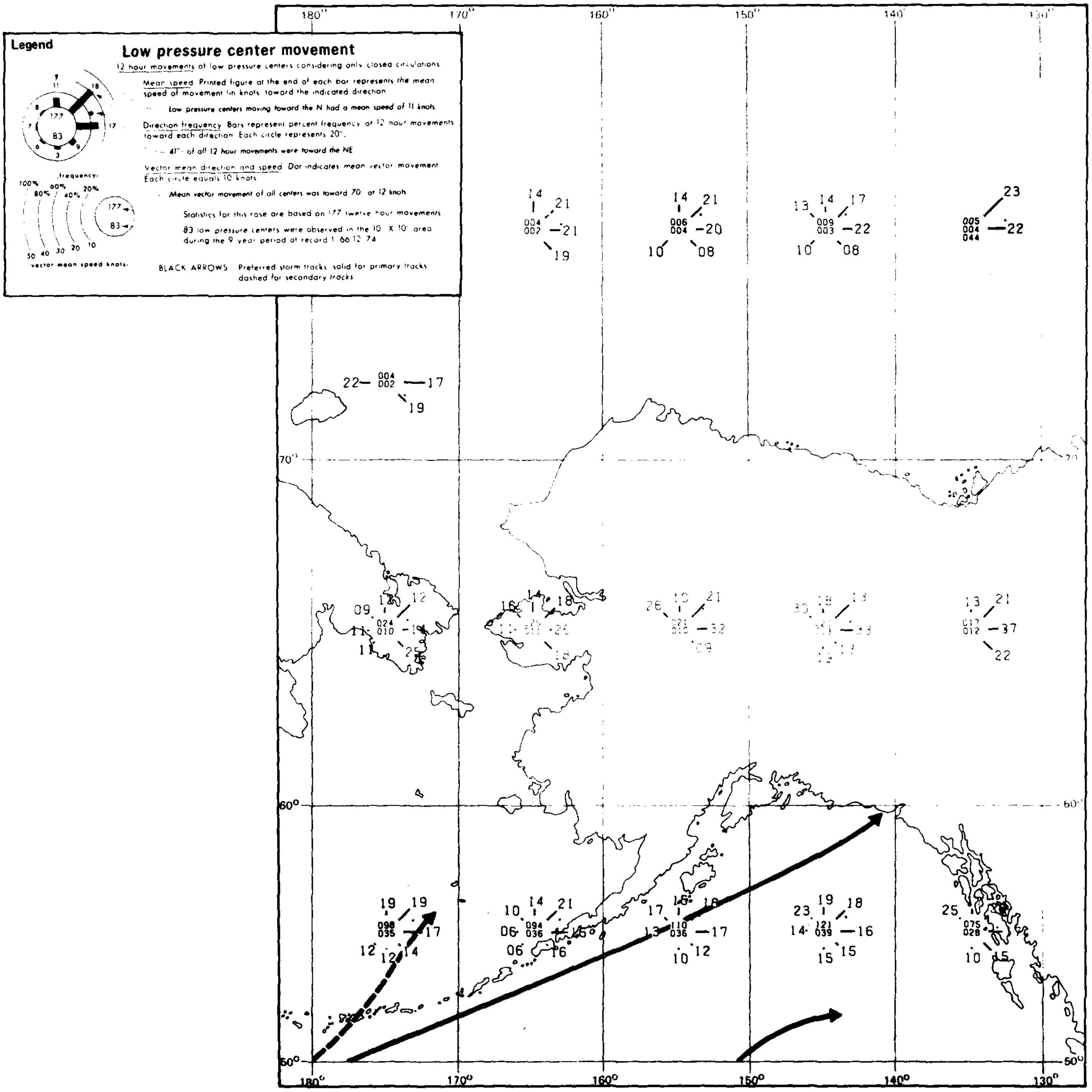
Marine Area E

PERIOD (SECONDS)

HEIGHT (MTRS)	<6	6-7	8-9	10-11	12-13	>13	IND
0-.5	9	1	+	+	0	0	2
1-1.5	[illegible]	15	4	1	1	+	1
2-2.5	6	11	7	2	+	+	1
3-3.5	1	4	4	2	1	+	+
4-5.5	+	2	2	1	+	+	+
6-7.5	0	+	1	+	+	+	+
8-9.5	0	+	0	+	0	+	+
≥10	0	0	+	+	0	+	0
							3538

17 Wave height thresholds (hazardous)

September

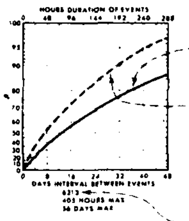


September

18 Low pressure center movement

Legend

Persistence of visibility <2 n. mi.



Hours duration of events · Days interval between events

Cumulative percent frequency of hours duration equal to or less than the number of hours intersected by the solid curve.

(80% of the events had a duration ≤216 hours.)

Cumulative percent frequency of days interval between events equal to or less than the number of days intersected by the broken curve

(88% of the events were followed by another event in 28 days or less.)

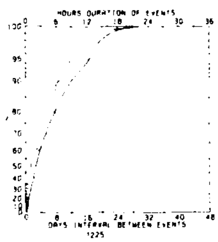
The maximum value(s) of hours duration and/or the days interval will be displayed when the graph limits are exceeded.

Durations and intervals for a particular month extend from the time they begin (or the first of the month if already in progress) and are terminated at the actual ending time, regardless of what month that may be

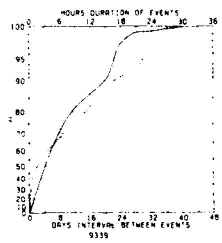
Number of observations

Top and bottom scales are variable to allow for variations in the data

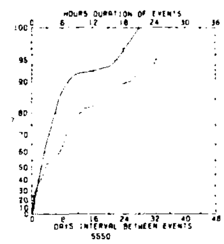
Adak



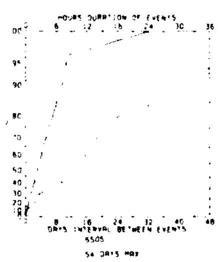
Nome



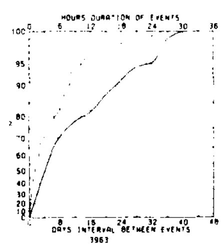
Moses Point



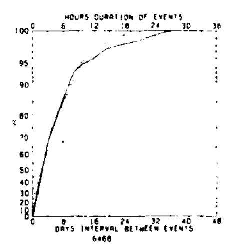
Unalakleet



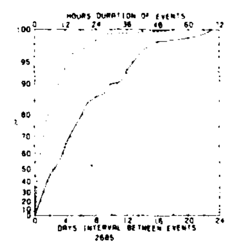
Cape Romanzof



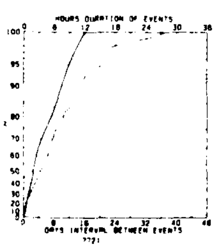
Bethel



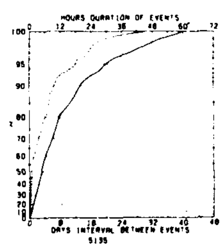
Nikolski



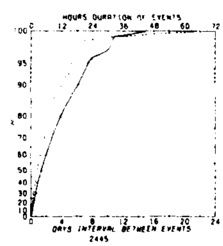
King Salmon



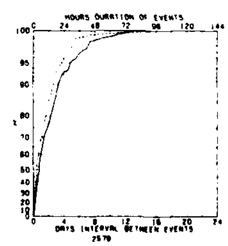
St. Paul



Port Moller



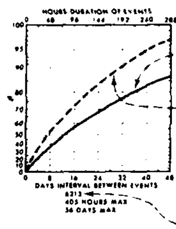
Driftwood Bay



19 Persistence of visibility <2 n. mi. **September**

Legend

Persistence of wind ≥10 kts.



Hours duration of events Days interval between events

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(80% of the events had a duration ≤216 hours.)

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(88% of the events were followed by another event in 28 days or less.)

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Number of observations

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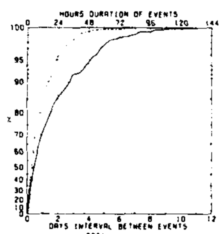
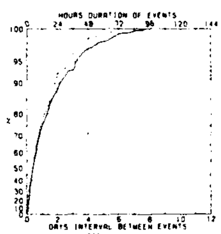
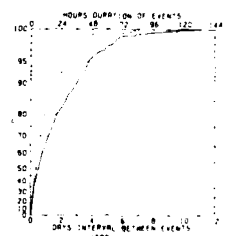
Adak



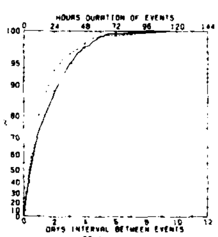
Nome



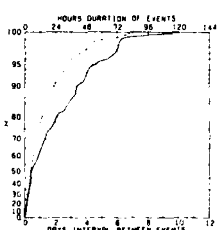
Moses Point



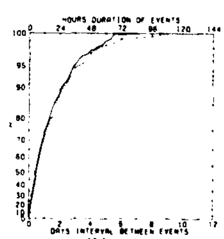
Unalakleet



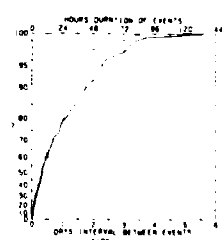
Cape Romanzof



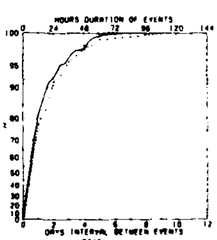
Bethel



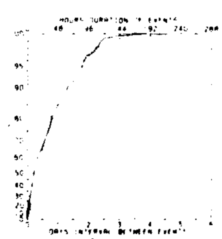
Nikolski



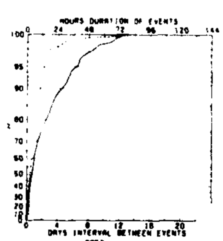
King Salmon



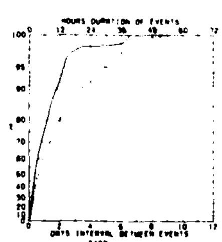
St. Paul



Port Moller

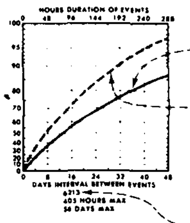


Driftwood Bay



Legend

Persistence of wind ≥20 kts.



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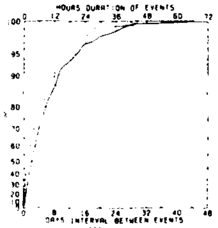
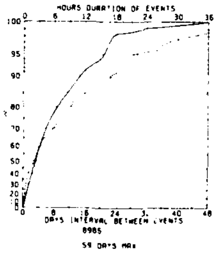
Number of observations

Top and bottom scales are variable to allow for variations in the data

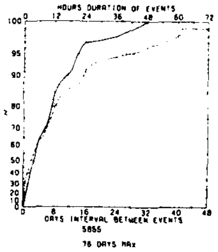
Adak



Nome

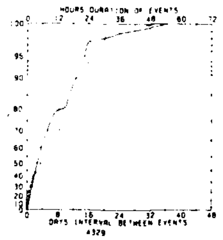


Moses Point

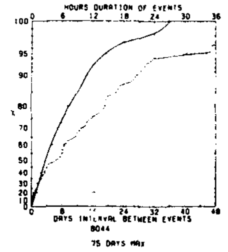


Unalakleet

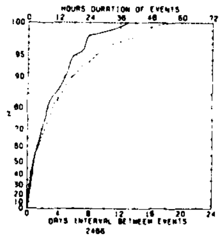
Cape Romanzof



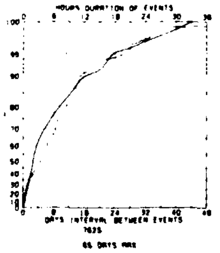
Bethel



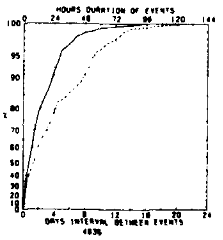
Nikolski



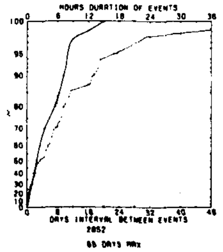
King Salmon



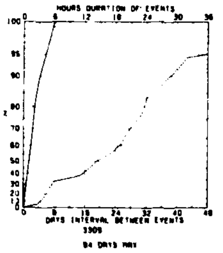
St. Paul



Port Moller



Driftwood Bay



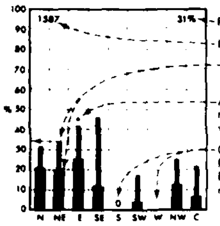
21 Persistence of wind ≥20 kts. **September**

Legend

Precipitation/wind direction

% Pcpn: % Liquid, % Snow

Percent frequency of surface wind observations from each direction and calm that were accompanied by precipitation, subdivided into liquid type (including freezing rain and freezing drizzle) and snow



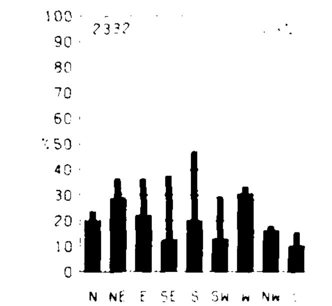
- Percentage of present weather observations reporting precipitation
- Number of observations
- (34% of all NE winds were accompanied by precipitation, of which 14% was liquid and 20% was snow
- An asterisk in the column for a given direction (or calm) indicates that the percentage was based on 10 30 observations of present weather and wind direction
- 0 replaces bar when no precipitation was observed with winds from a given direction (or calm). No bar graph is presented if less than 10 observations containing present weather were reported for a given direction (or calm)

Map - Precipitation

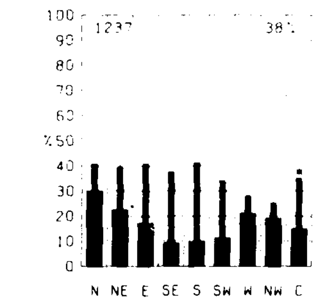
BLACK LINE Percent frequency of observations reporting precipitation

Of all the elements recorded in historical marine observations, precipitation is one of those most subject to interpretation error, from coding practices, observers preference for certain present weather codes, and other biases

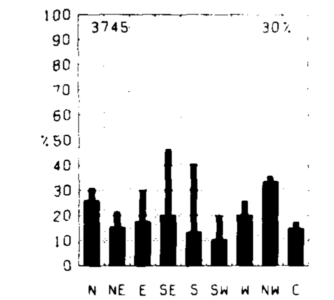
Buhta Provideniya



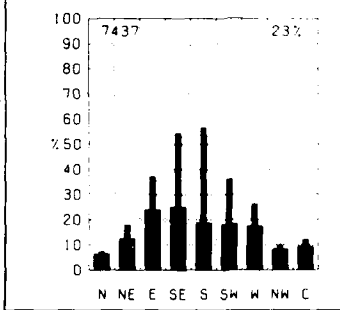
Gambell



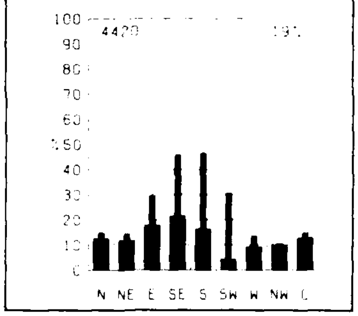
Northeast Cape



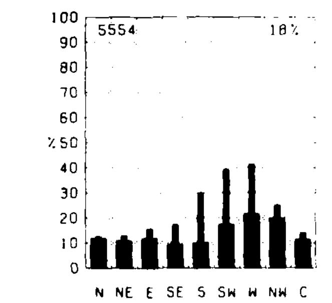
Nome



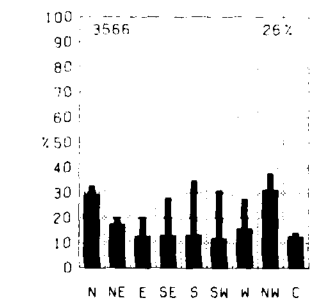
Moses Point



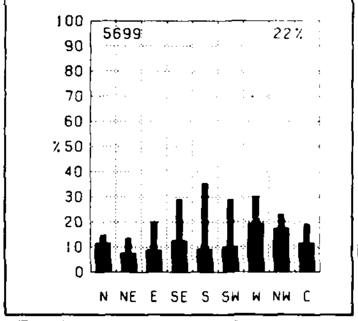
Unalakleet



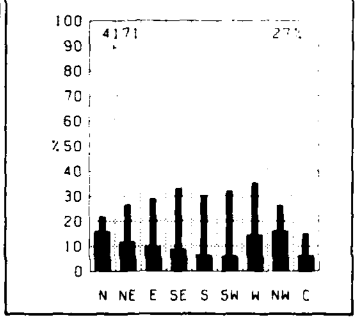
Cape Romanzof



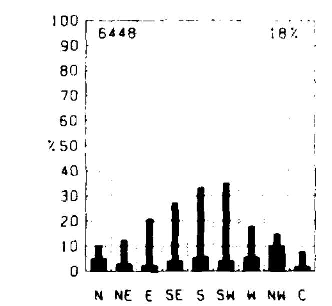
Bethel



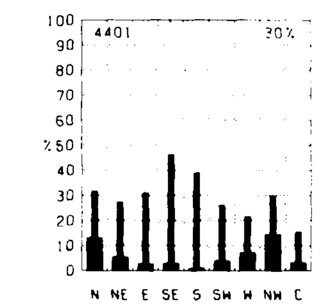
Cape Newenham



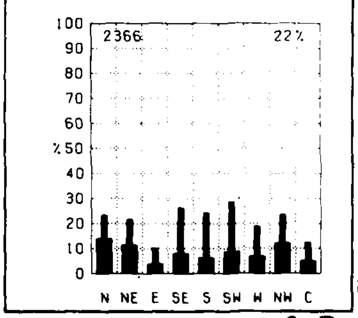
King Salmon



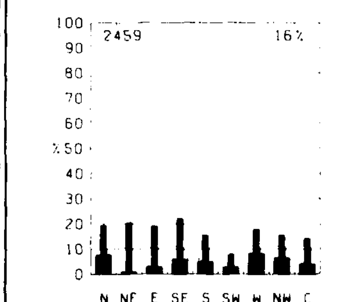
St. Paul

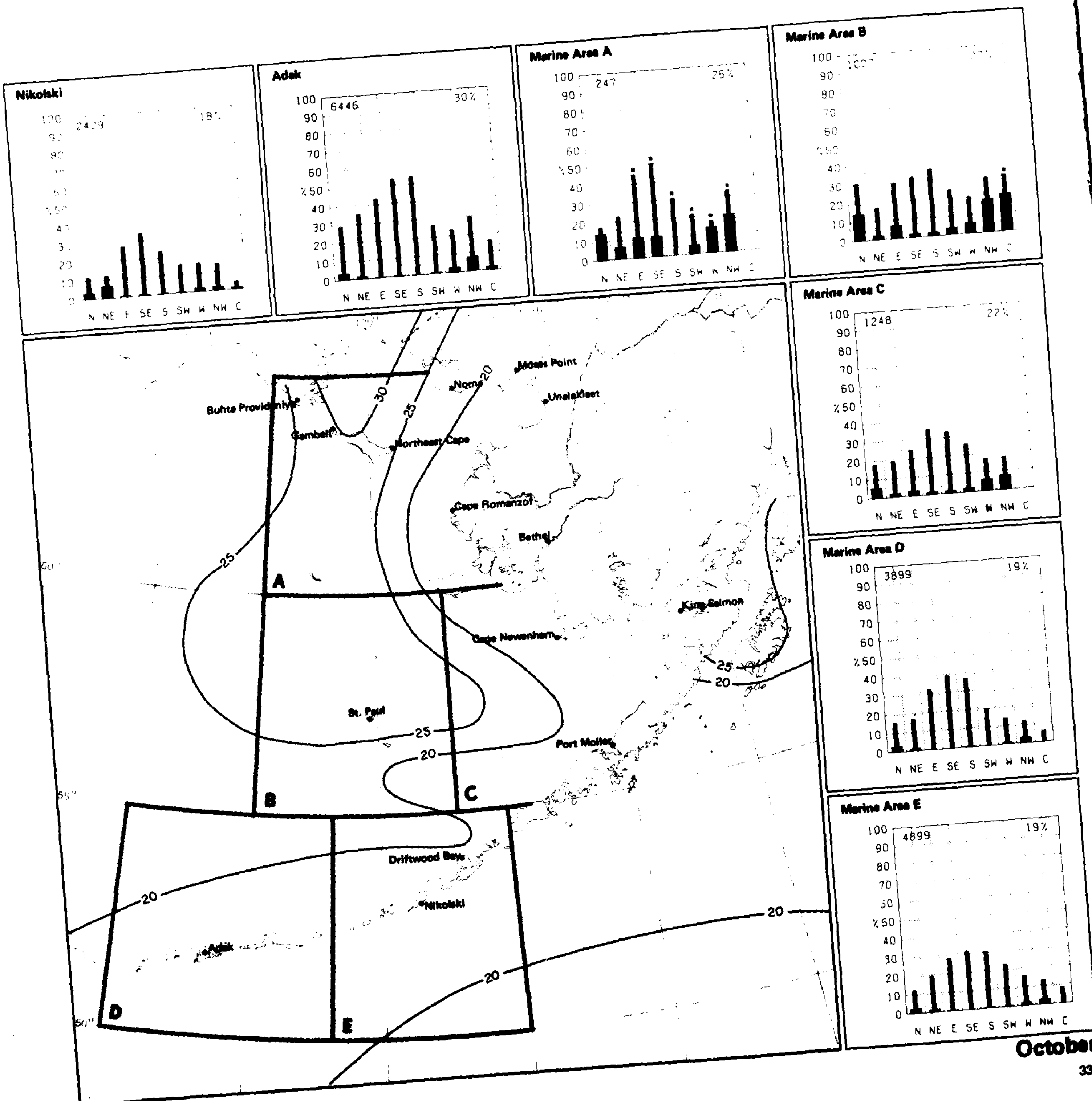


Port Moller



Driftwood Bay



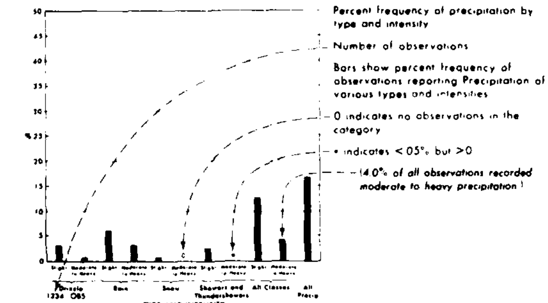


1 Precipitation

October

Legend

Precipitation types

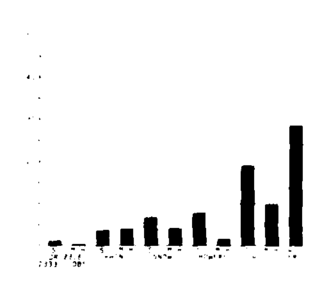


Map - Snow

BLACK LINE Percent frequency of precipitation observations reporting snow

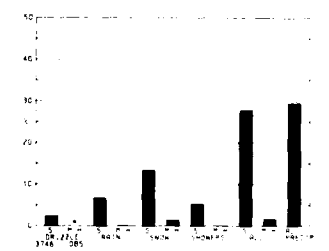
The percent frequency of observations reporting snow for a given point can be determined by multiplying the percent frequency of observations reporting precipitation (map 1) with that of precipitation observations reporting snow (map 2)

Buhta Provideniya

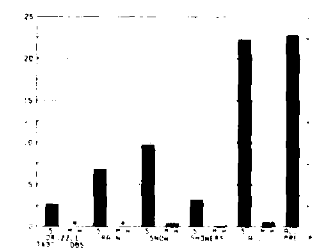


Gambell

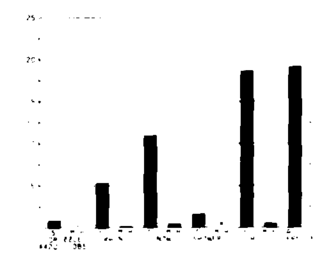
Northeast Cape



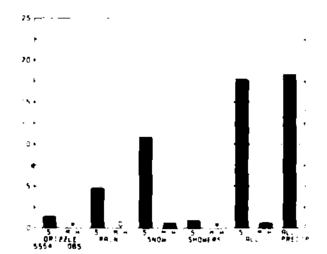
Nome



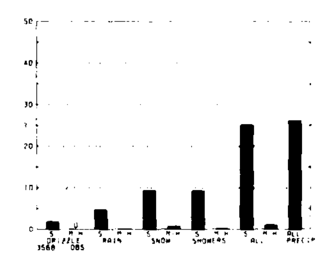
Moses Point



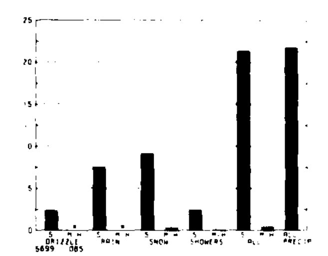
Unalakleet



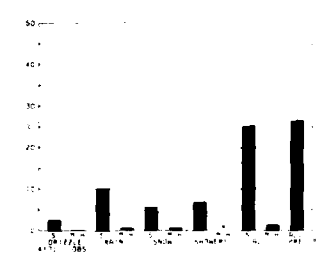
Cape Romanzof



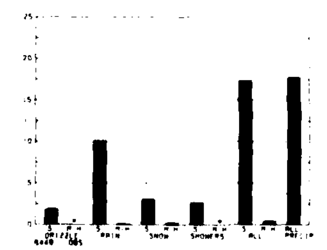
Bethel



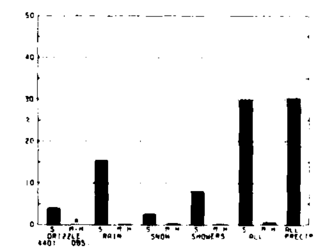
Cape Newenham



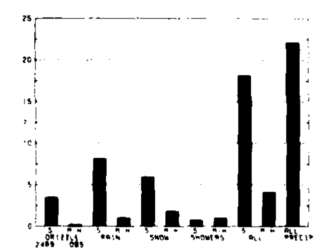
King Salmon



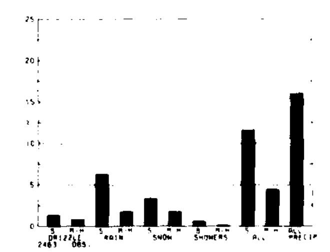
St. Paul

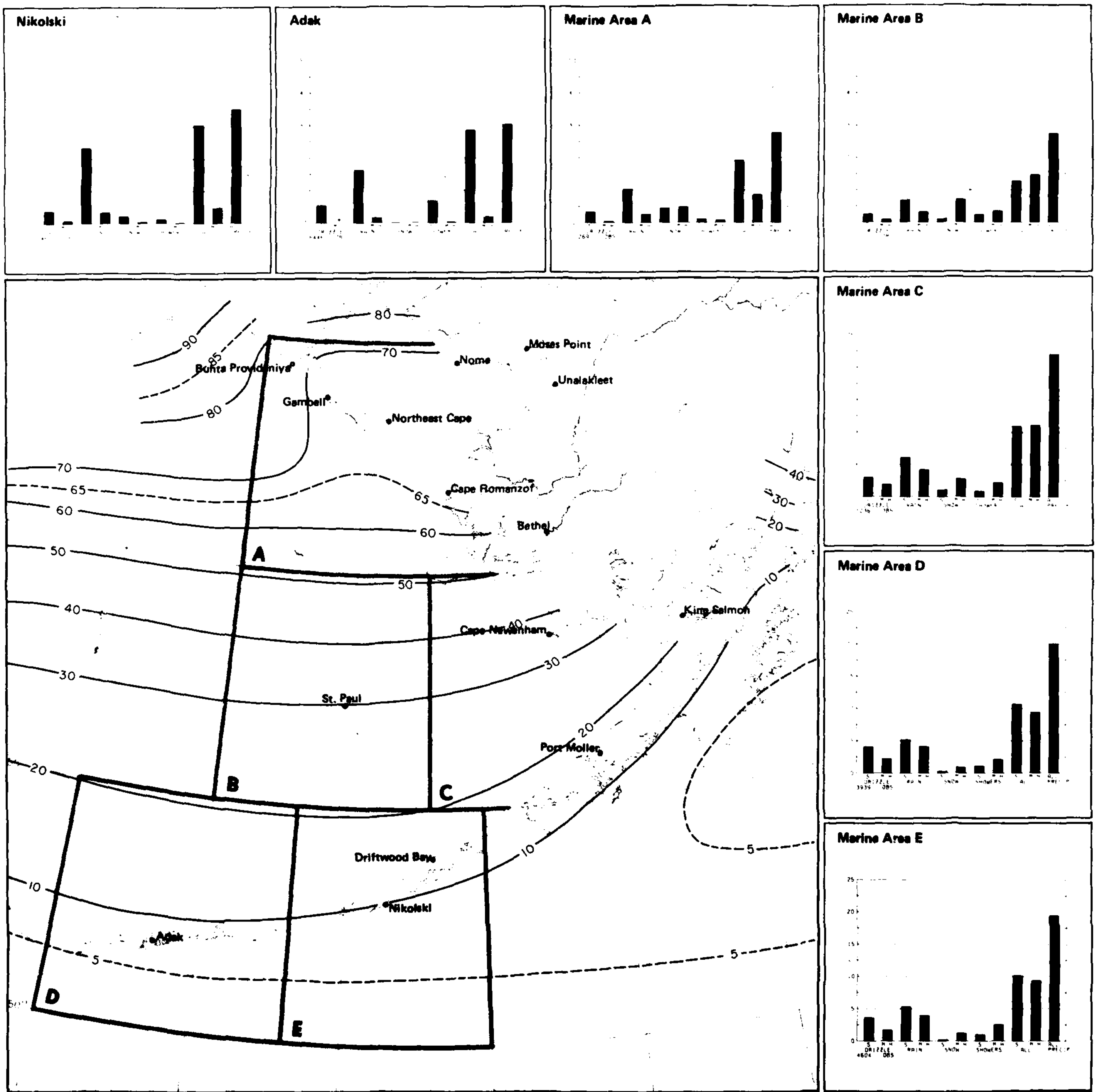


Port Moller



Driftwood Bay



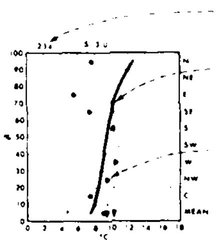


2 Snow

October

Legend

Air temperature/wind direction



Number of observations

Cumulative percent frequency of temperatures equal to or less than the temperature intersected by the curve

70% of all temperatures were ≤10.3 °C or ≤50.5 °F

S Standard deviation of temperatures (°C)

Mean temperature for each wind direction, calm and for all data combined are represented by dots

With NW winds, the mean temperature was 9.4 °C or 48.9 °F

Indicates that the mean temperature for a direction or calm was computed from 10-30 observations

The mean temperature is omitted when less than 10 observations for a direction or calm were available

Map - Air temperature mean and thresholds

BLACK LINE Percent frequency of temperature ≤0°C ≤32°F

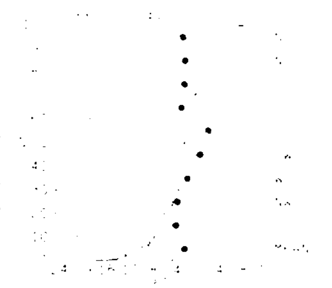
RED LINE Mean air temperature °C

BLUE LINE Percent frequency of wind chill temperature ≤ 30°C ≤ 22°F

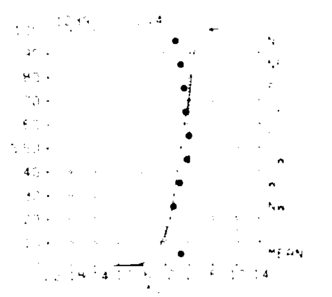
Air temperature readings recorded on transient ships in warm, sunny weather appear biased toward high temperatures, apparently because of improper instrument exposure and ventilation. Despite the inaccuracies, the large scale patterns and mean gradients of the isopleth analyses are relatively accurate.

The temperature scale of the graph may vary in both range and class interval. The percentage of temperature observations greater than a given value can be obtained by subtracting the cumulative percent frequency of that value from 100%. The number of observations and the standard deviation plus the plotted points on the graphs are based on those observations reporting both temperature and wind direction. The cumulative curve is based on all observations reporting temperature with or without wind direction.

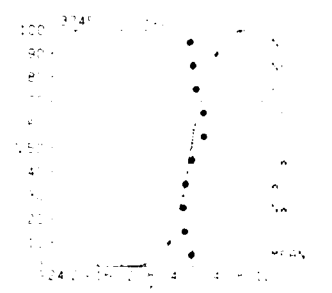
Buhta Provideniya



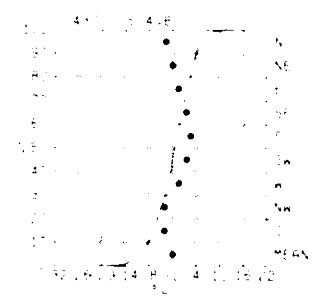
Gambell



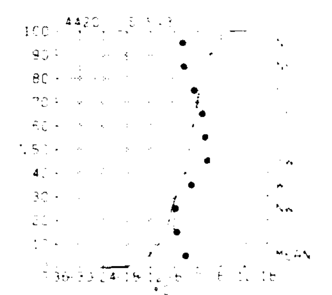
Northeast Cape



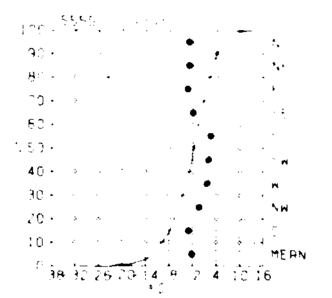
Nome



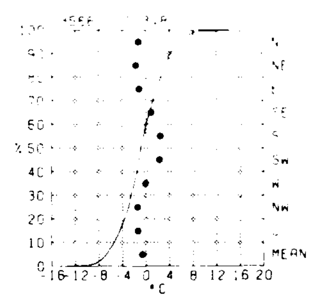
Moses Point



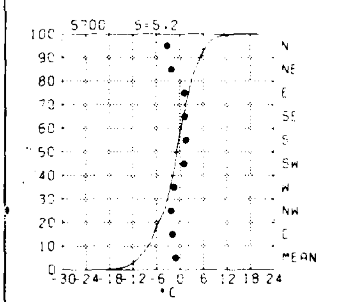
Unalakleet



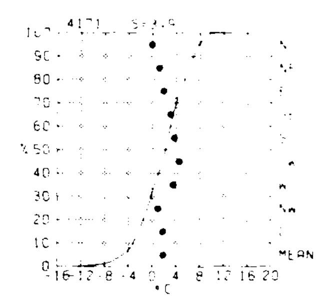
Cape Romanzof



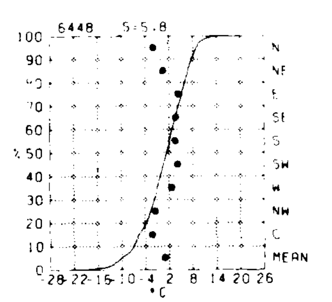
Bethel



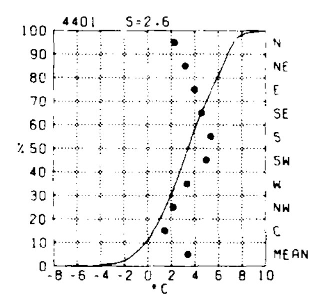
Cape Newenham



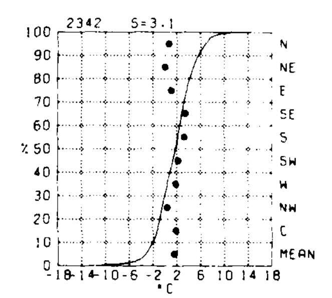
King Salmon



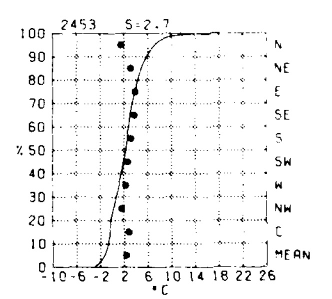
St. Paul

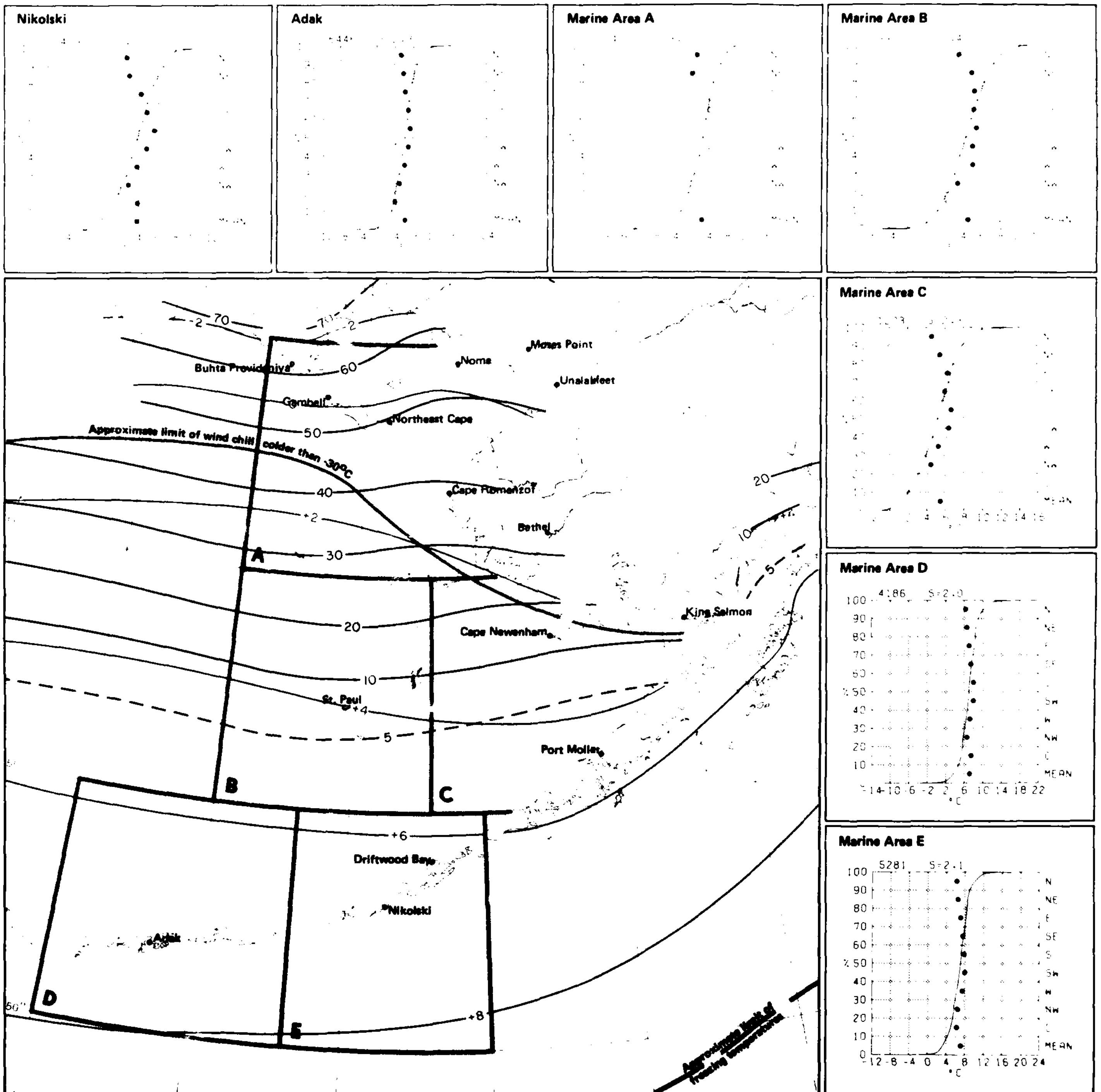


Port Moller



Driftwood Bay

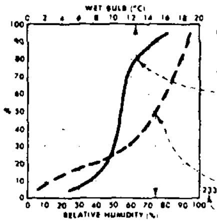




3 Air temperature mean and thresholds **October**

Legend

Wet bulb/relative humidity



Cumulative percent frequency of wet bulb temperatures equal to or less than the temperature intersected by the curve (top scale)

Wet bulb °C)

(80% of all observed wet-bulb temperatures were ≤12.5°C or 54.5°F)

Cumulative percent frequency of relative humidities equal to or less than the humidity intersected by the curve (bottom scale)

Relative humidity (%)

(50% of all observed relative humidities were ≤74%)

Number of observations

Map · Mean dew point temperature

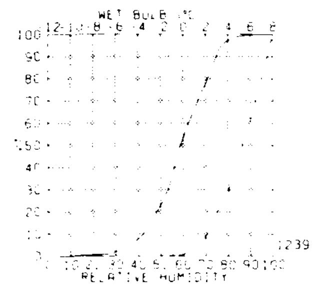
BLACK LINE Mean dew point temperature °C

The observation count of the graph reflects those observations reporting both air and wet bulb temperatures; both are required in computing the relative humidity. The percentage of observations of either element greater than a given value can be obtained by subtracting the cumulative percent frequency of that value from 100%.

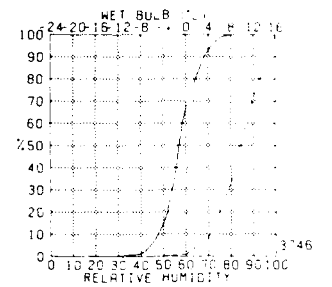
Buhta Provideniya

Insufficient Data

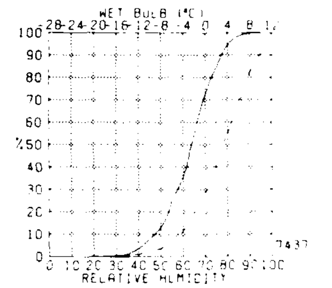
Gambell



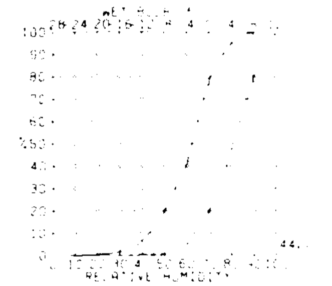
Northeast Cape



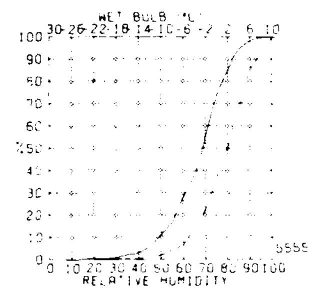
Nome



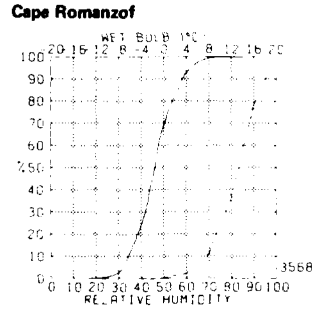
Moses Point



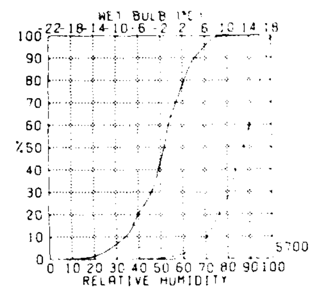
Unalakleet



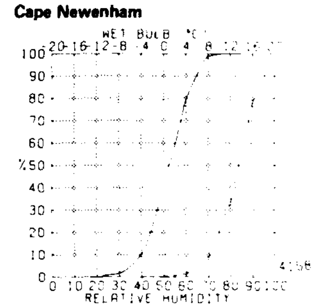
Cape Romanzof



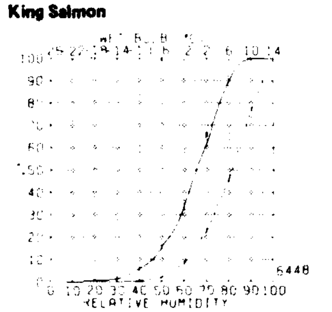
Bethel



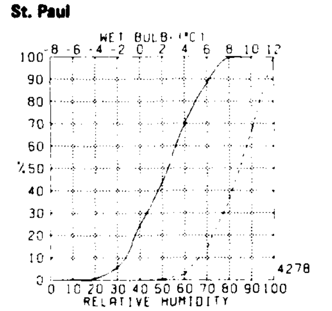
Cape Newenham



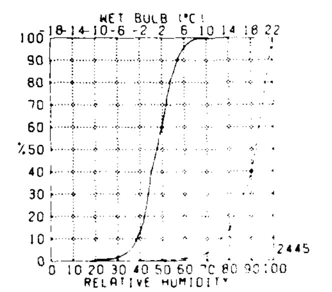
King Salmon



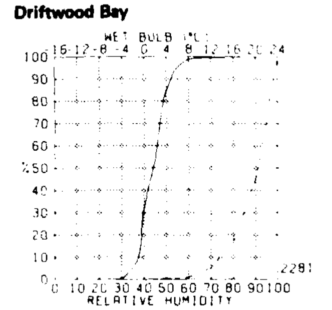
St. Paul

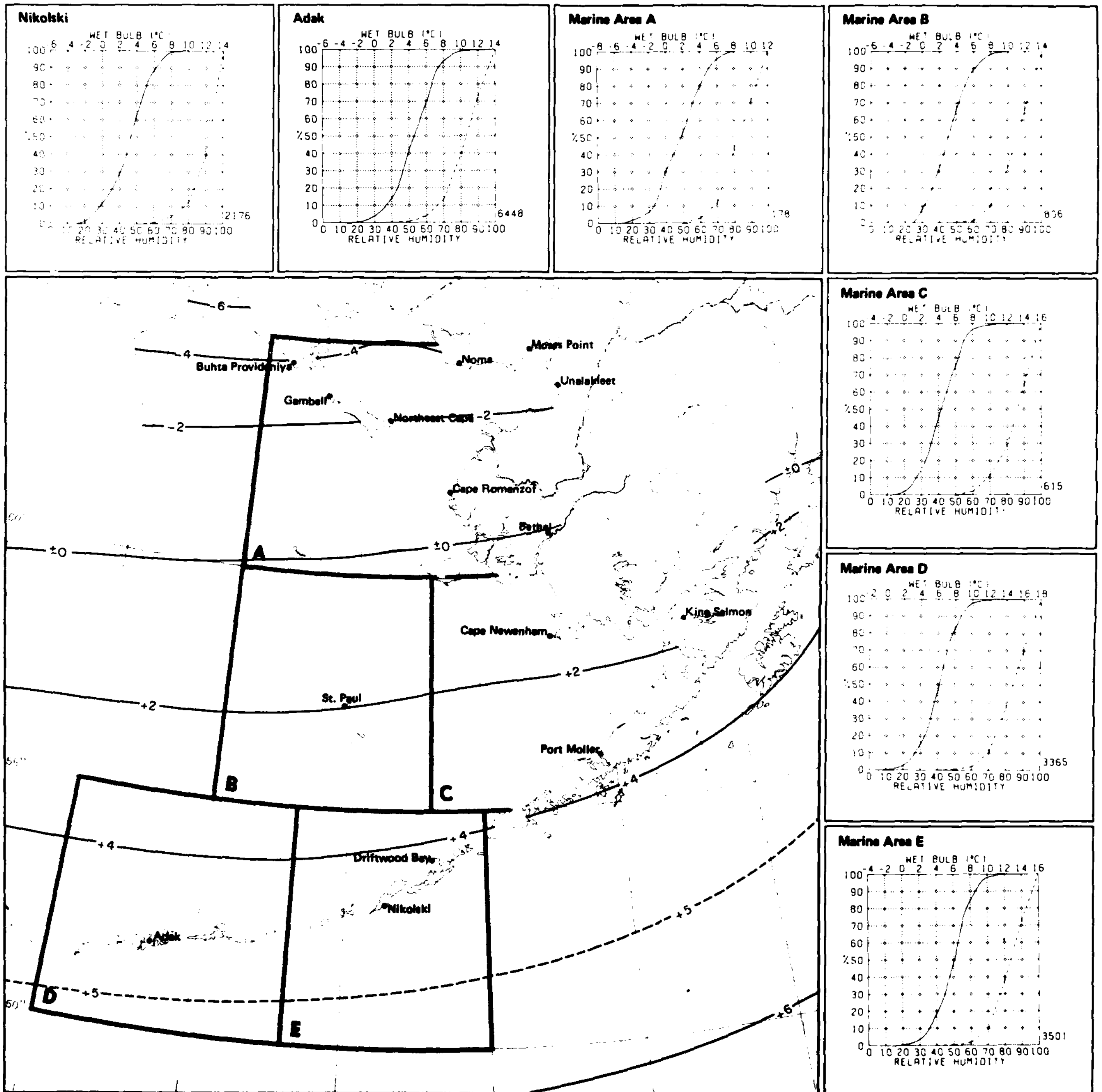


Port Moller



Driftwood Bay

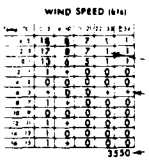




4 Mean dew point temperature **October**

Legend

Air temperature/wind speed



Percent frequency of simultaneous occurrence of specified temperature (°C) and wind speed (knots).

(1% of all observations reported temperature 2-3°C simultaneously with wind speed of 22-33 kts)

Indicates < 5% but >0

Number of observations

Map - Air temperature extremes (°C)

BLACK LINE Maximum (99%) air temperature (1% of temperatures were greater than the given value

BLUE LINE Minimum (1%) air temperature (1% of temperatures were equal to or less than the given value

The graph can be used to determine the extent of human discomfort from the combined effects of extreme heat or cold and winds or to estimate the likelihood of superstructure icing. Icing potential increases as the air temperature drops below freezing and the winds increase above 10 knots (12 mph) and may become quite severe with temperatures equal to or less than -9°C (16°F) and winds equal to or greater than 34 knots (39 mph).

Buhta Provideniya

Gambell

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
8.9	0	0	+	0	0
6.7	0	+	1	0	0
4.5	+	+	5	2	+
2.3	1	5	16	10	+
0.1	1	5	13	9	1
-2.-1	1	3	10	6	+
-4.-3	1	3	2	3	+
-6.-5	0	1	+	+	0
-8.-7	0	+	+	0	0
-10.-9	+	+	0	0	0
-12.-11	0	0	0	0	0

1239

Northeast Cape

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
8.9	+	+	+	+	0
6.7	+	1	3	1	+
4.5	+	2	4	1	+
2.3	1	4	10	2	+
0.1	1	5	12	4	+
-2.-1	2	7	13	3	+
-4.-3	1	4	7	2	+
-6.-5	1	1	2	+	+
-8.-7	+	1	1	+	0
-10.-9	0	+	+	0	0
≤-11	+	+	0	0	0

3745

Nome

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
14.15	0	0	+	+	0
12.13	0	+	+	+	0
10.11	+	+	+	0	0
8.9	+	+	+	+	0
6.7	+	2	2	1	+
4.5	+	3	3	1	+
2.3	1	6	7	1	+
0.1	1	6	6	1	+
-2.-1	2	9	5	1	+
-4.-3	2	8	5	+	+
≤-5	6	15	5	1	+

7437

Moses Point

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
14.15	0	0	+	[illegible]	[illegible]
12.13	0	0	+	+	[illegible]
10.11	[illegible]	+	+	+	[illegible]
8.9	+	+	+	+	[illegible]
6.7	+	1	+	+	+
4.5	+	1	2	1	+
2.3	1	4	6	1	+
0.1	[illegible]	5	6	+	[illegible]
-2.-1	2	[illegible]	[illegible]	1	[illegible]
-4.-3	2	6	6	1	[illegible]
≤-5	5	16	11	1	0

4420

Unalakleet

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
12.13	0	+	+	+	0
10.11	0	+	+	+	0
8.9	+	+	1	+	0
6.7	+	1	2	+	0
4.5	1	2	3	+	+
2.3	1	5	6	1	+
0.1	2	5	5	1	+
-2.-1	2	7	6	1	0
-4.-3	2	5	5	2	0
-6.-5	1	4	3	+	+
≤-7	3	10	7	1	+

5555

Cape Romanzof

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
14.15	+	+	+	0	0
12.13	+	0	+	0	0
10.11	+	+	+	0	0
8.9	+	1	+	+	0
6.7	+	2	2	+	0
4.5	1	3	3	1	+
2.3	1	6	7	1	+
0.1	2	5	8	2	+
-2.-1	3	8	10	2	+
-4.-3	2	5	7	1	+
≤-5	3	5	5	1	+

3566

Bethel

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
20.21	0	+	0	0	0
18.19	0	0	0	0	0
16.17	0	+	+	0	0
14.15	0	+	+	+	0
12.13	0	+	+	0	0
10.11	+	+	+	0	0
8.9	+	1	1	+	0
6.7	+	3	3	+	0
4.5	+	4	3	+	0
2.3	1	8	5	1	0
≤1	5	39	22	2	0

5700

Cape Newenham

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
16.17	0	0	0	+	0
14.15	0	0	0	0	0
12.13	0	+	+	+	
10.11	+	+	+	+	0
8.9	1	1	3	+	0
6.7	1	7	5	+	0
4.5	2	7	6	1	0
2.3	3	9	9	1	0
0.1	3	6	5	1	+
-2.-1	2	5	5	1	+
≤-3	2	5	6	1	+

4171

King Salmon

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
20.21	+	0	0	0	0
18.19	+	0	0	0	0
16.17	+	+	[illegible]	0	0
14.15	0	+	+	0	0
12.13	+	+	+	+	+
10.11	+	1	1	+	+
8.9	1	4	3	1	+
6.7	[illegible]	6	[illegible]	1	+
4.5	1	6	4	+	+
2.3	[illegible]	[illegible]	4	+	0
≤1	11	[illegible]	11	1	+

6448

St. Paul

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
10.11	0	0	+	0	0
8.9	+	1	2	1	+
6.7	+	4	13	6	+
4.5	+	4	11	6	1
2.3	1	7	13	7	1
0.1	+	5	7	3	+
-2.-1	+	3	3	+	+
-4.-3	+	1	+	+	0
-6.-5	0	+	0	0	0
-8.-7	0	+	0	0	0
-10.-9	0	0	0	0	0

4401

Port Moller

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
12.13	+	0	+	+	0
10.11	0	+	+	0	0
8.9	+	1	+	+	0
6.7	2	3	3	1	0
4.5	2	7	5	1	+
2.3	4	12	10	1	0
0.1	3	11	9	1	0
-2.-1	2	6	7	1	0
-4.-3	1	2	3	+	0
-6.-5	+	+	+	+	0
≤-7	0	1	1	+	0

2342

Driftwood Bay

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
18.19	0	+	+	0	0
16.17	0	+	+	0	0
14.15	0	+	+	0	0
12.13	0	+	+	0	0
10.11	+	1	+	+	0
8.9	1	1	+	0	0
6.7	2	5	2	+	0
4.5	3	11	4	+	0
2.3	5	19	8	+	0
0.1	3	14	5	+	0
≤-1	2	9	4	+	+

2453

Nikolski

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥34
10.11	0	0	·	[illegible]	[illegible]
8.9	·	[illegible]	[illegible]	·	[illegible]
6.7	[illegible]	[illegible]	11	4	·
4.5	2	[illegible]	14	[illegible]	·
2.3	[illegible]	[illegible]	13	[illegible]	1
[illegible]	·	[illegible]	[illegible]	4	·
[illegible]	·	[illegible]	[illegible]	[illegible]	·
[illegible]	[illegible]	[illegible]	[illegible]	·	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	0	[illegible]	[illegible]	·	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0

2429

Adak

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥34
14.15	0	0	·	·	·
12.13	0	·	·	·	·
10.11	·	1	2	1	·
8.9	1	5	9	3	·
6.7	3	12	17	6	1
4.5	3	8	8	2	·
2.3	3	5	4	1	·
0.1	·	1	·	·	0
-2.-1	1	·	0	0	0
-4.-3	·	0	0	0	0
-6.-5	·	0	0	0	0

5446

Marine Area A

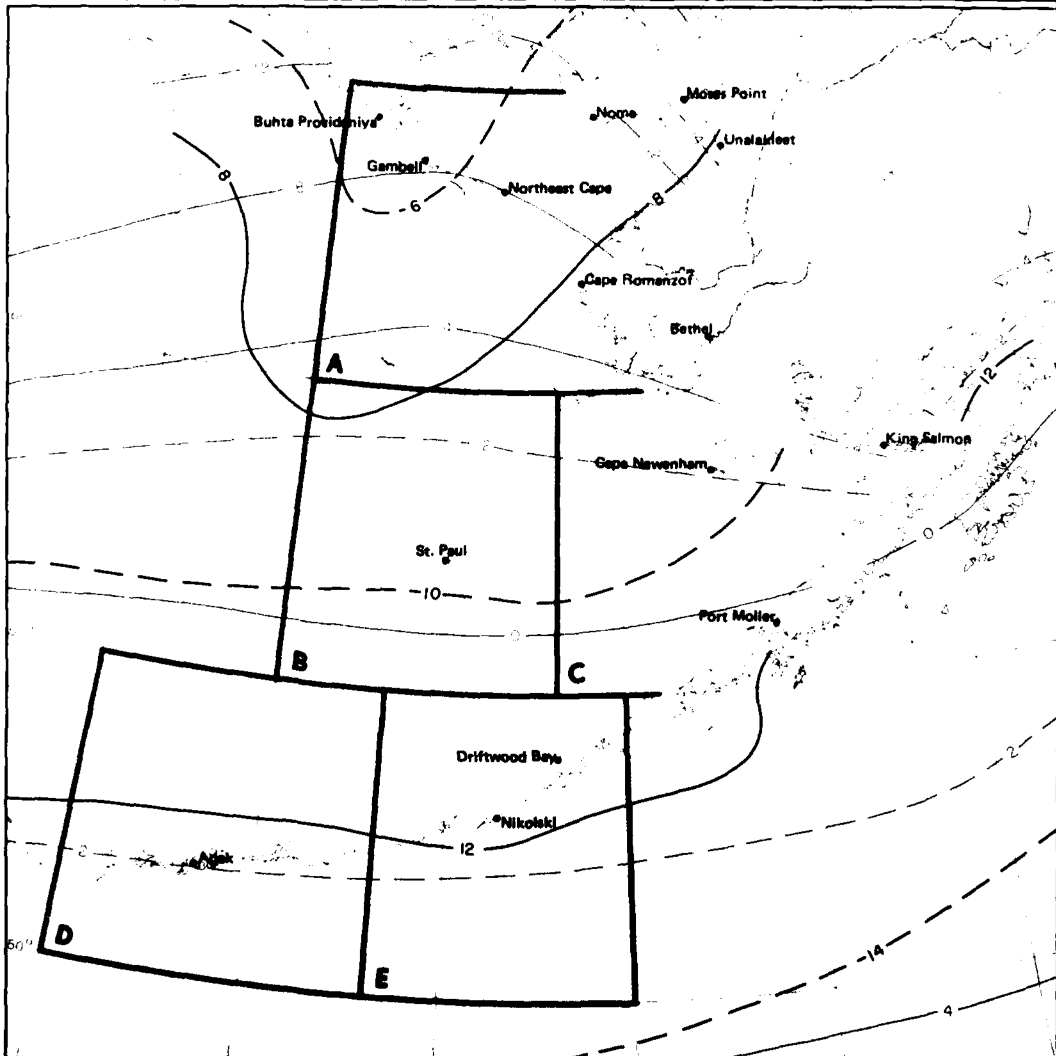
WIND SPEED (KTS)

[illegible]

Marine Area B

WIND SPEED (KTS)

[illegible]



Marine Area C

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥34
14.15	0	[illegible]	·	[illegible]	[illegible]
12.13	0	·	·	[illegible]	[illegible]
10.11	·	[illegible]	[illegible]	[illegible]	·
8.9	·	[illegible]	[illegible]	4	[illegible]
6.7	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4.5	·	[illegible]	12	[illegible]	[illegible]
2.3	·	4	[illegible]	[illegible]	[illegible]
0.1	0	·	2	[illegible]	[illegible]
-2.-1	0	·	·	[illegible]	[illegible]
-4.-3	0	[illegible]	0	0	0
-6.-5	[illegible]	[illegible]	0	[illegible]	0

12[illegible]3

Marine Area D

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥34
16.17	·	·	0	·	0
14.15	·	·	·	·	0
12.13	·	·	[illegible]	·	·
10.11	1	2	4	2	·
8.9	1	8	13	9	2
6.7	1	9	[illegible]	10	4
4.5	·	3	5	3	1
2.3	·	·	·	·	·
0.1	0	·	·	·	·
-2.-1	0	·	·	0	0
-4.-3	0	0	0	0	0

4186

Marine Area E

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥34
16.17	·	·	·	0	·
14.15	0	·	·	·	0
12.13	·	·	1	·	·
10.11	·	2	4	3	1
8.9	1	7	13	10	2
6.7	1	6	15	10	3
4.5	1	3	6	4	1
2.3	·	1	2	1	·
0.1	0	·	·	·	·
-2.-1	0	0	0	·	0
-4.-3	0	0	0	0	0

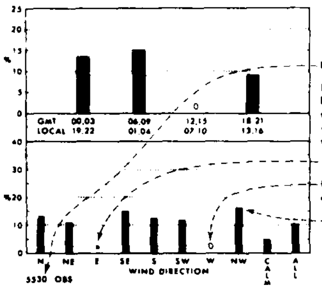
5281

5 Air temperature extremes (°C)

October

Legend

Fog/time and fog/wind direction



Number of observations

Bar graphs represent percent frequency of Fog (without precipitation) for various hour groupings and wind directions. Data are based on 100% for each hour-group and direction category

• indicates < 05% but >0

0 indicates no fog occurred with the wind direction

(Data show that 17% of all NW winds were accompanied by Fog (without precipitation))

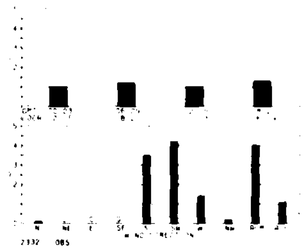
Map · Fog

BLACK LINE Percent frequency of occurrence of all fog

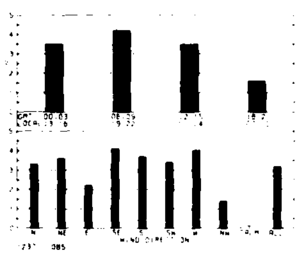
BLUE LINE Percent frequency of fog occurring without precipitation

The percent frequency of observations reporting fog with precipitation for a given point can be determined by computing the difference between the two analyses

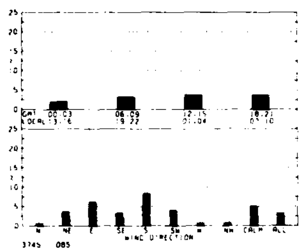
Buhta Provideniya



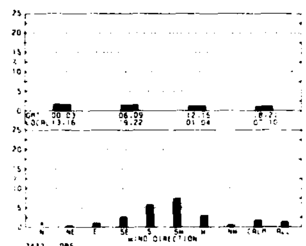
Gambell



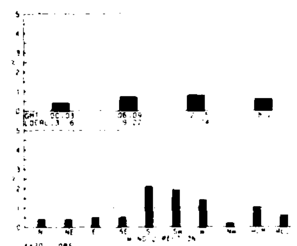
Northeast Cape



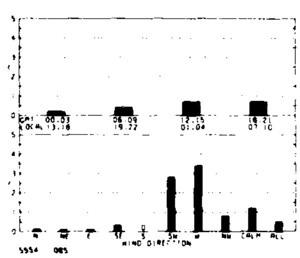
Nome



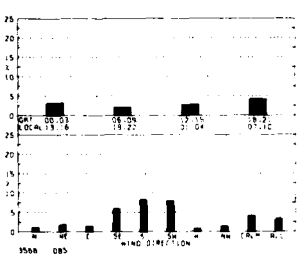
Moses Point



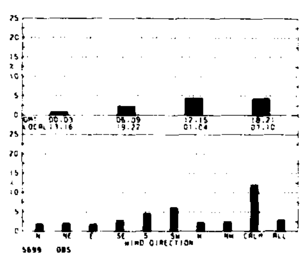
Unalakleet



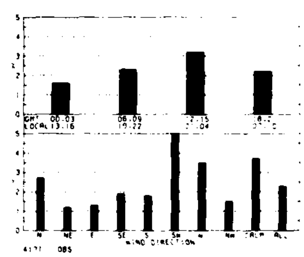
Cape Romanzof



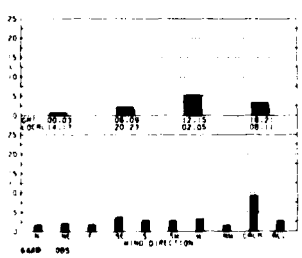
Bethel



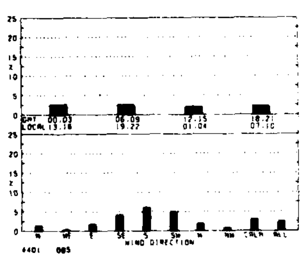
Cape Newenham



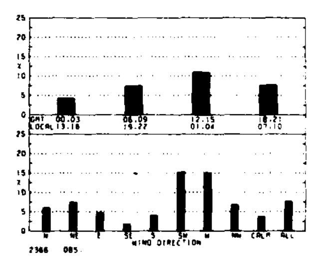
King Salmon



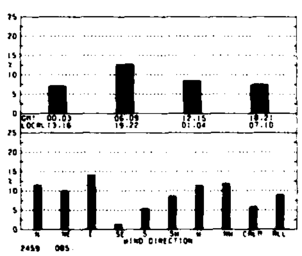
St. Paul

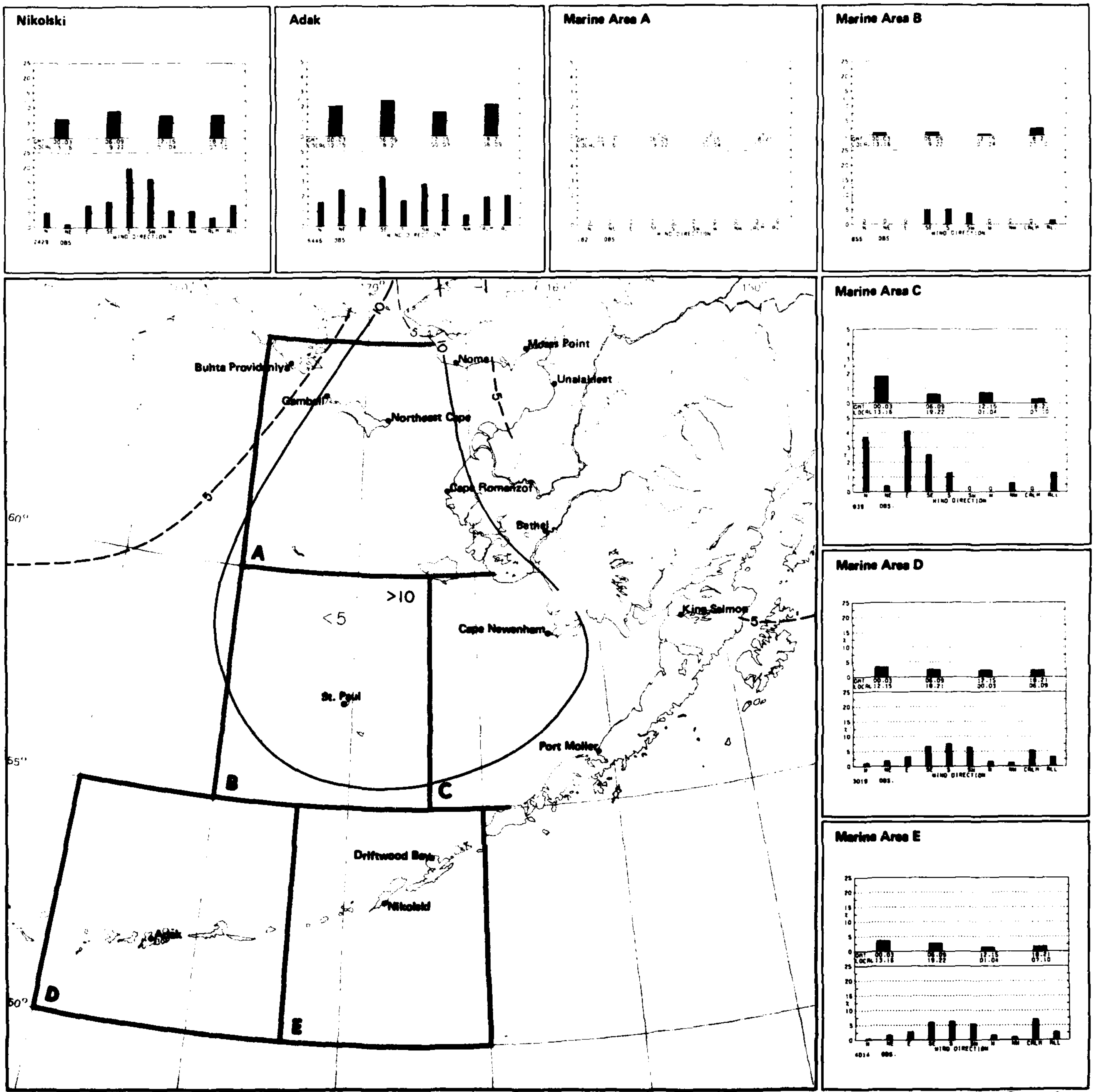


Port Moller



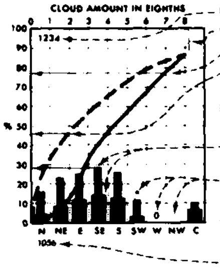
Driftwood Bay





6 Fog **October**

Legend — Cloud cover/wind direction



Total Cloud Amount / Low Cloud Amount: Cumulative percent frequency of indicated cloud amount equal to or less than the amount intersected by the curve.

Number of total cloud observations

Obscurations

(77% of all total cloud amounts were ≤7/8.)

(46% of all low cloud amounts were ≤2/8.)

≥5/8, 5/8 & 6/8, ≥7/8: Low cloud amount. Percent frequency of observations from each direction and calm that were accompanied by low cloud amounts ≥5/8 and ≥7/8. Low clouds are clouds with bases <8000 feet

(28% of all SE winds were accompanied by low cloud amounts ≥5/8 and 14% by low cloud amounts ≥7/8.)

An asterisk indicates that the percentage is based on 10-30 observations of wind direction, total and low cloud amount. 0 replaces bar graph when no low cloud amounts ≥5/8 were observed with a wind direction or calm. 0 or bar is omitted when number of observations of total and low cloud amount from a wind direction or calm is less than 10

Number of low cloud observations

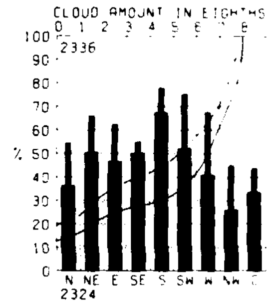
Map · Cloud amount thresholds

BLACK LINE Percent frequency of total cloud amount ≤2/8

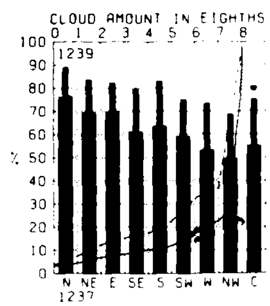
BLUE LINE Percent frequency of low cloud amount ≥5/8

Since the number of observations reporting low cloud amount is usually less than that for total cloud amount, somewhat different samples may be used to compute the two curves on the graph. This may lead to inconsistencies where low cloud amount appears higher than the total cloud amount. Where this occurred the graph was adjusted in favor of the total cloud by making the curves coincide. The frequency of obscured conditions may be determined by subtracting the cumulative percent frequency corresponding to 8/8 coverage from 100%. In computing the bar graph, obscurations are considered as 8/8 coverage

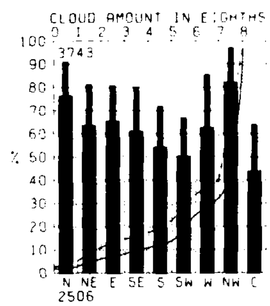
Buhta Provideniya



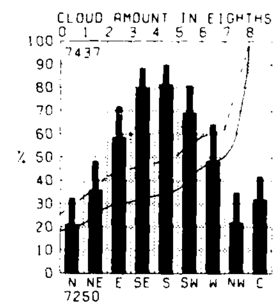
Gambell



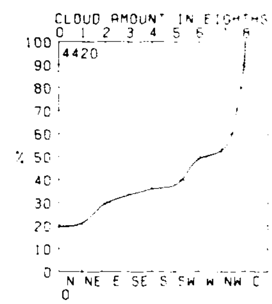
Northeast Cape



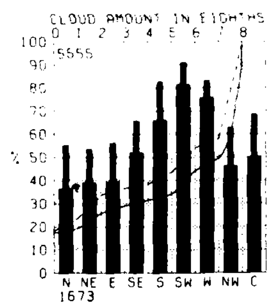
Nome



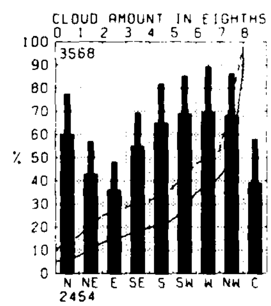
Moses Point



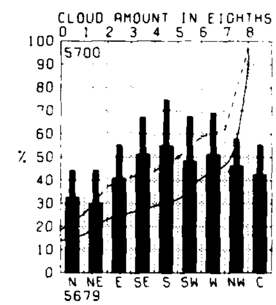
Unalakleet



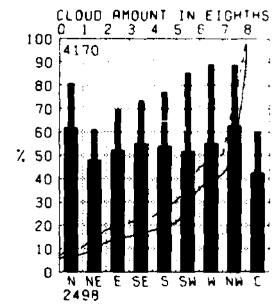
Cape Romanzof



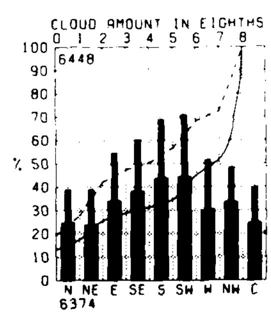
Bethel



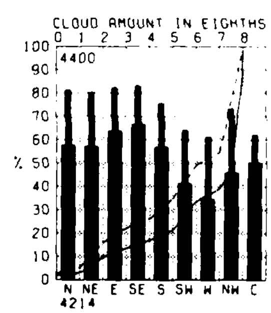
Cape Newenham



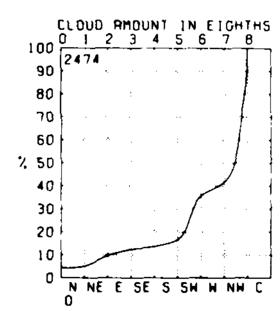
King Salmon



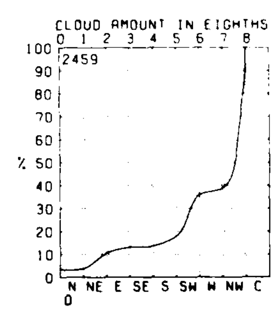
St. Paul

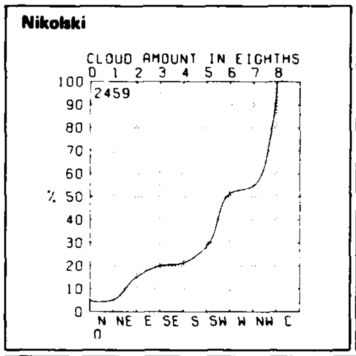


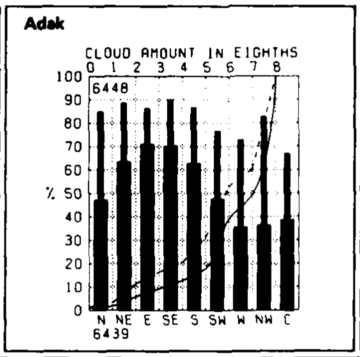
Port Moller

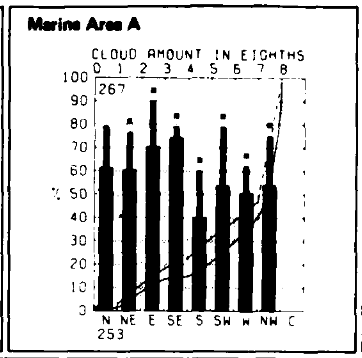


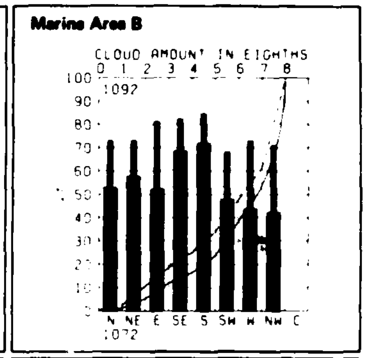
Driftwood Bay

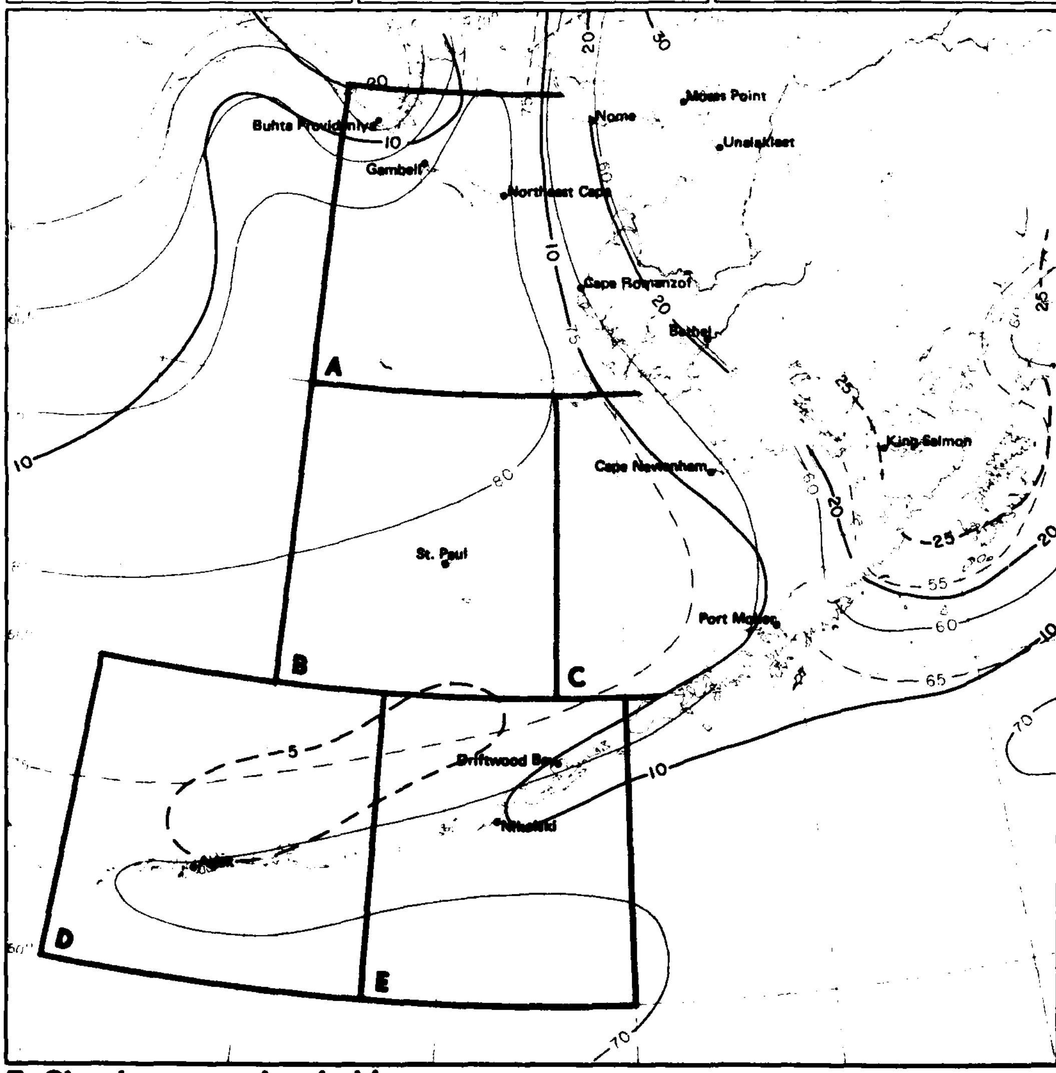


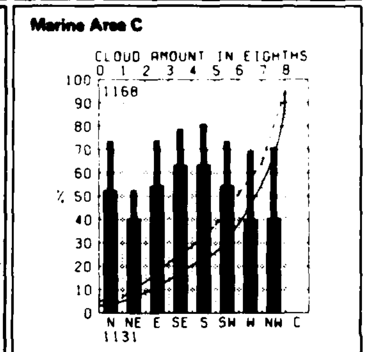


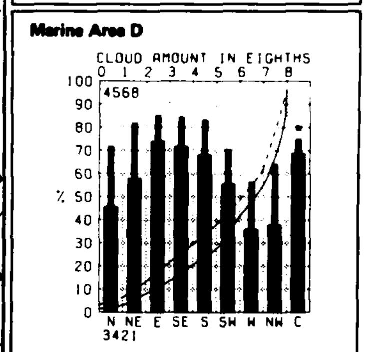


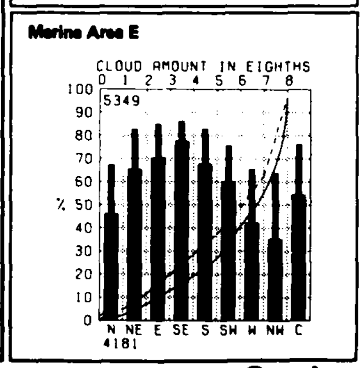










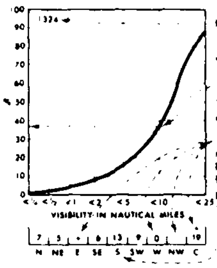


7 Cloud amount thresholds

October

Legend

Visibility/wind direction



Number of observations

Cumulative percent frequency of visibilities less than the visibility intersected by the curve

37% of all visibilities reported were <10 nautical miles

The table below the graph indicates percent frequency of occurrence of visibility <2 nautical miles versus wind direction

• indicates < 5% but >0. 0 indicates that no visibilities <2 nautical miles were observed with winds from a direction or calm. No percentage is given if less than 10 observations were available for visibility and wind direction. An asterisk indicates that the percentage was based on 10-30 observations of visibility and wind direction

13% of all S winds were accompanied by visibilities <2 nautical miles

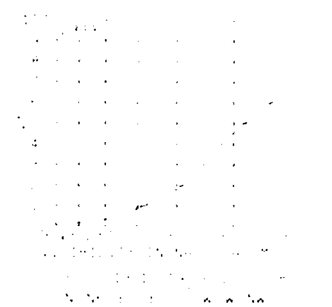
Map · Visibility thresholds

BLACK LINE Percent frequency of visibilities ≥5 nautical miles

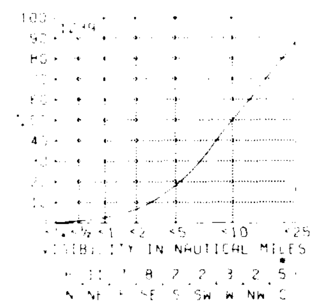
BLUE LINE Percent frequency of visibilities <2 nautical miles

The percentage of visibility equal to or greater than a given value can be obtained from the graph by subtracting the cumulative percent frequency of that value from 100%. Visibility at sea is difficult to measure because of the lack of reference points. Also, some observers seem to report reduced visibilities at night because of darkness, though this tendency has abated in recent years. The coarseness of the coding intervals, however, tends to minimize serious biases in the summarized data. Visibilities greater than 25 nmi should be interpreted cautiously because the earth's curvature makes it impossible to see 25 nmi horizontally from the bridges of most ships.

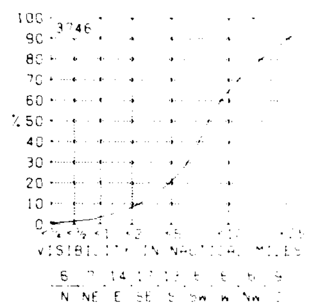
Buhta Provideniya



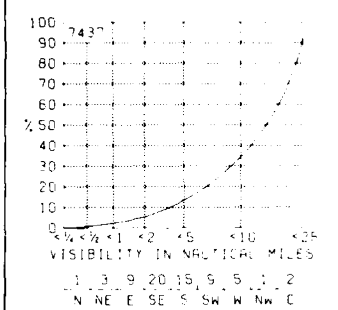
Gambell



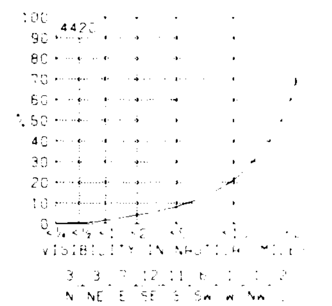
Northeast Cape



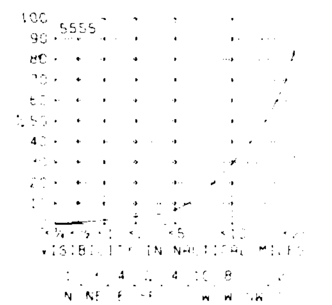
Nome



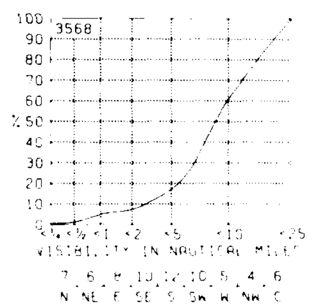
Moses Point



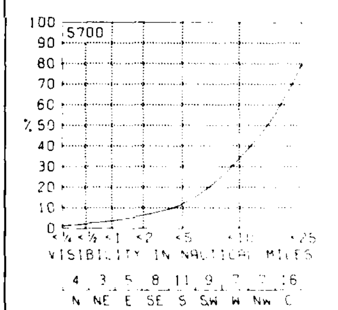
Unalakleet



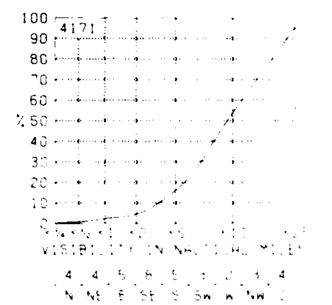
Cape Romanzof



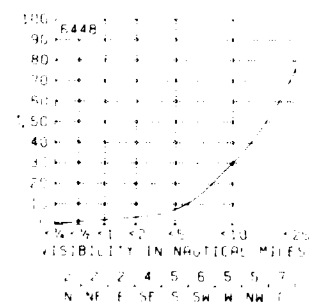
Bethel



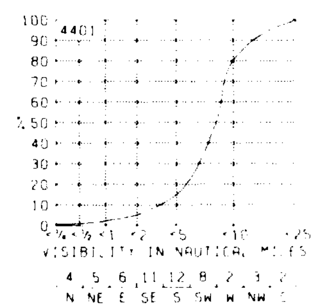
Cape Newenham



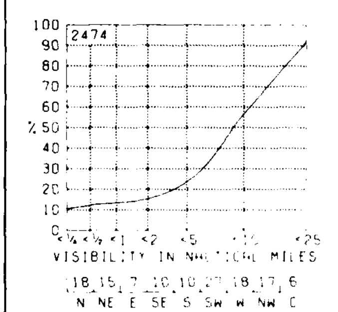
King Salmon



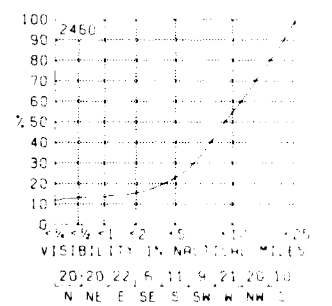
St. Paul

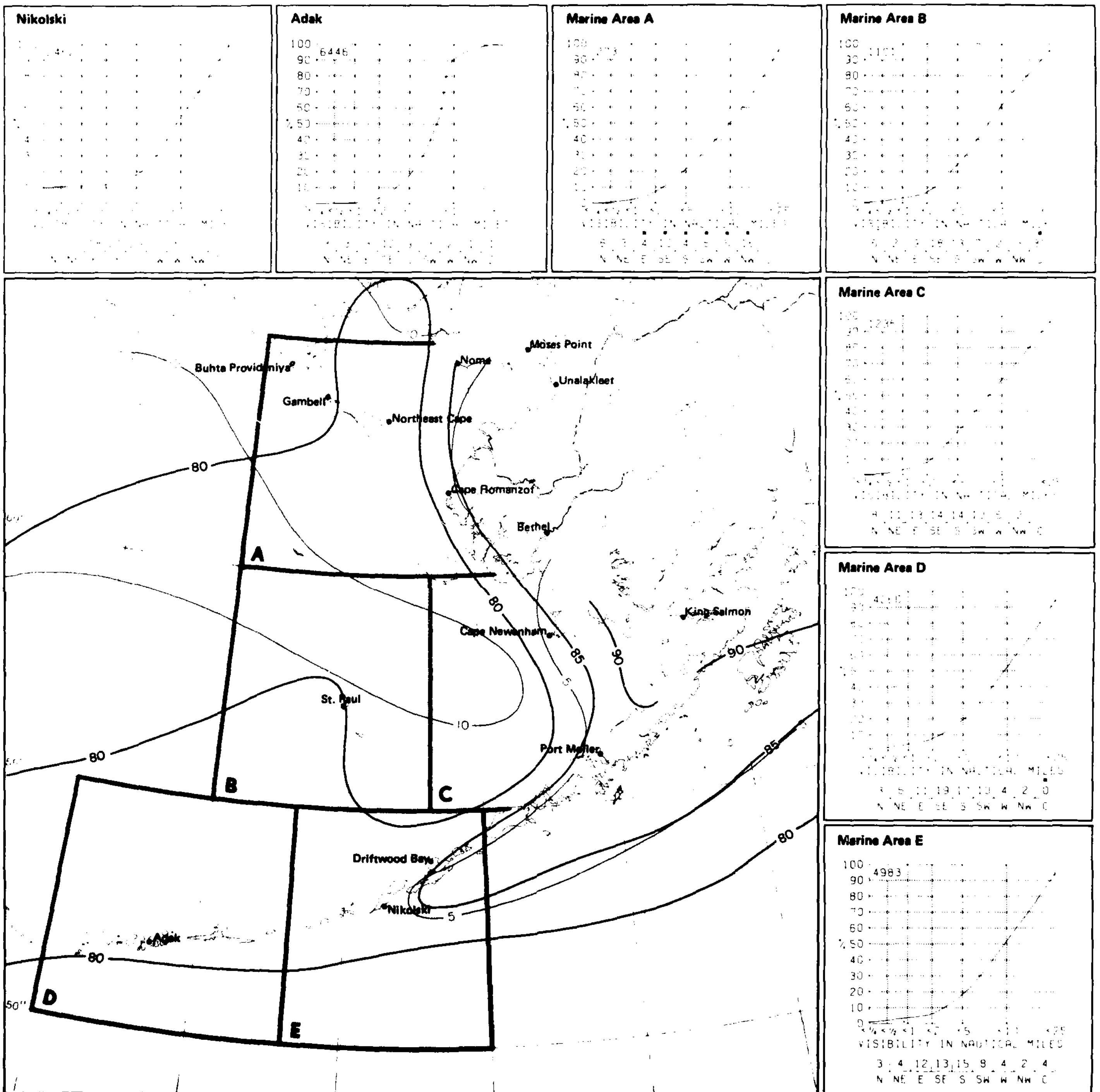


Port Moller



Driftwood Bay





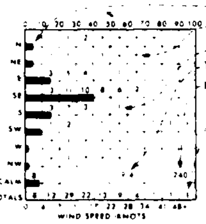
8 Visibility thresholds

October

Legend

Wind speed/direction

Direction frequency (top scale). Bars represent percent frequency of winds observed from each direction. Speed frequency (bottom scale). Printed figures represent percent frequency of wind speeds observed from each direction.



(4% of all winds were from the N.)

+ indicates < 5% but >0

(1% of all winds were from the S with a speed 22-27 knots.)

The scalar mean speed was 9.4 knots

Number of observations

(1% of winds from all directions had wind speed ≥48 knots)

WIND SPEED INTERVAL (KNOTS)

0-3	4-6	7-10	11-16	17-21	22-27	28-33	34-40	41-47	≥48

0 4 7 11 17 22 28 34 41 48+

Printed scale on bottom of chart

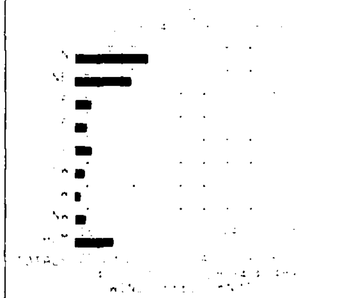
Map - Wind speed thresholds

BLACK LINE Percent frequency of wind speed ≤10 knots (≤12 mph)

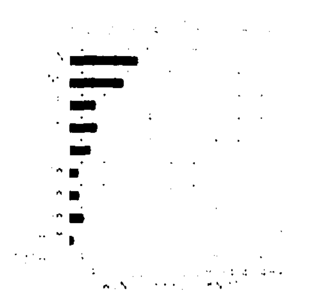
BLUE LINE Percent frequency of wind speed ≥34 knots (≥39 mph)

The scalar mean wind speed on the graph is based on the number of observations reporting a wind speed with direction. The sum of the totals line provides the cumulative percent frequency of wind speed below a selected threshold value. In the example graph, 71% of all winds were less than 17 knots (20 mph).

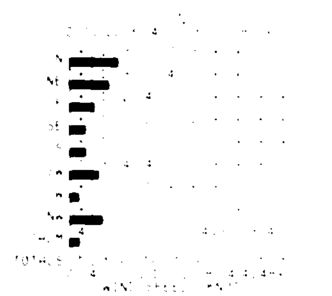
Buhta Provideniya



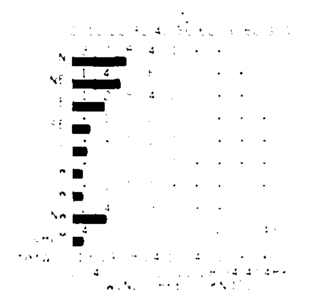
Gambell



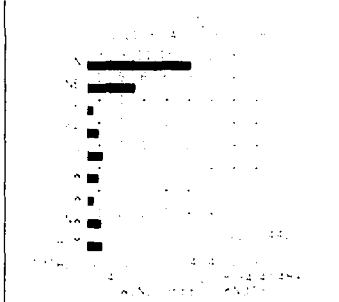
Northeast Cape



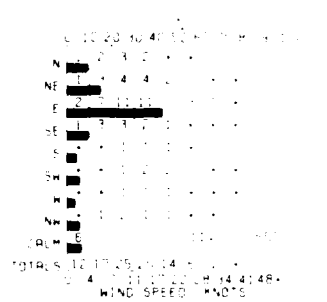
Nome



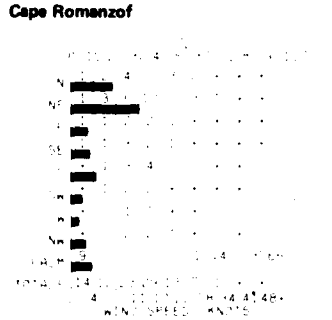
Moses Point



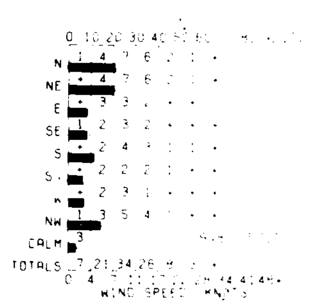
Unalakleet



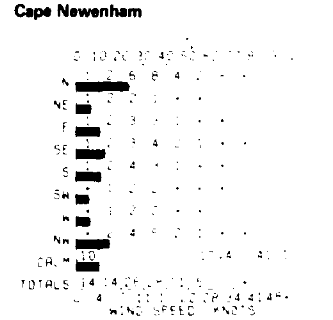
Cape Romanzof



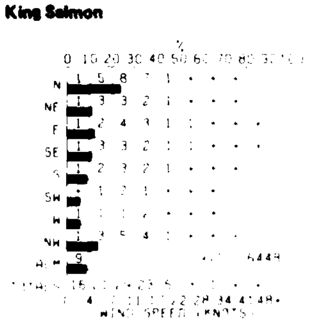
Bethel



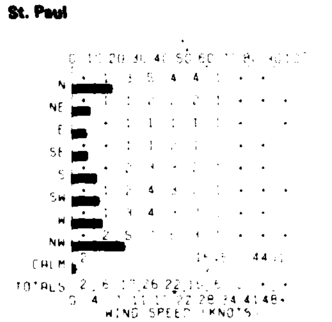
Cape Newenham



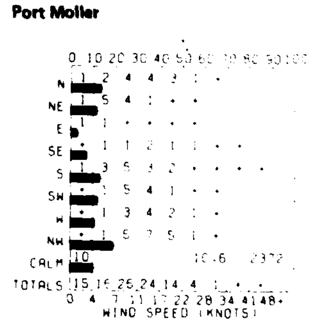
King Salmon



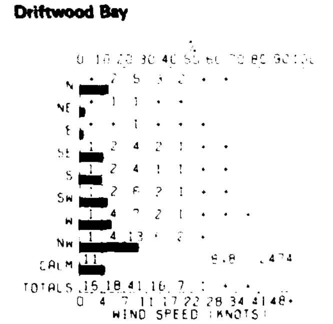
St. Paul

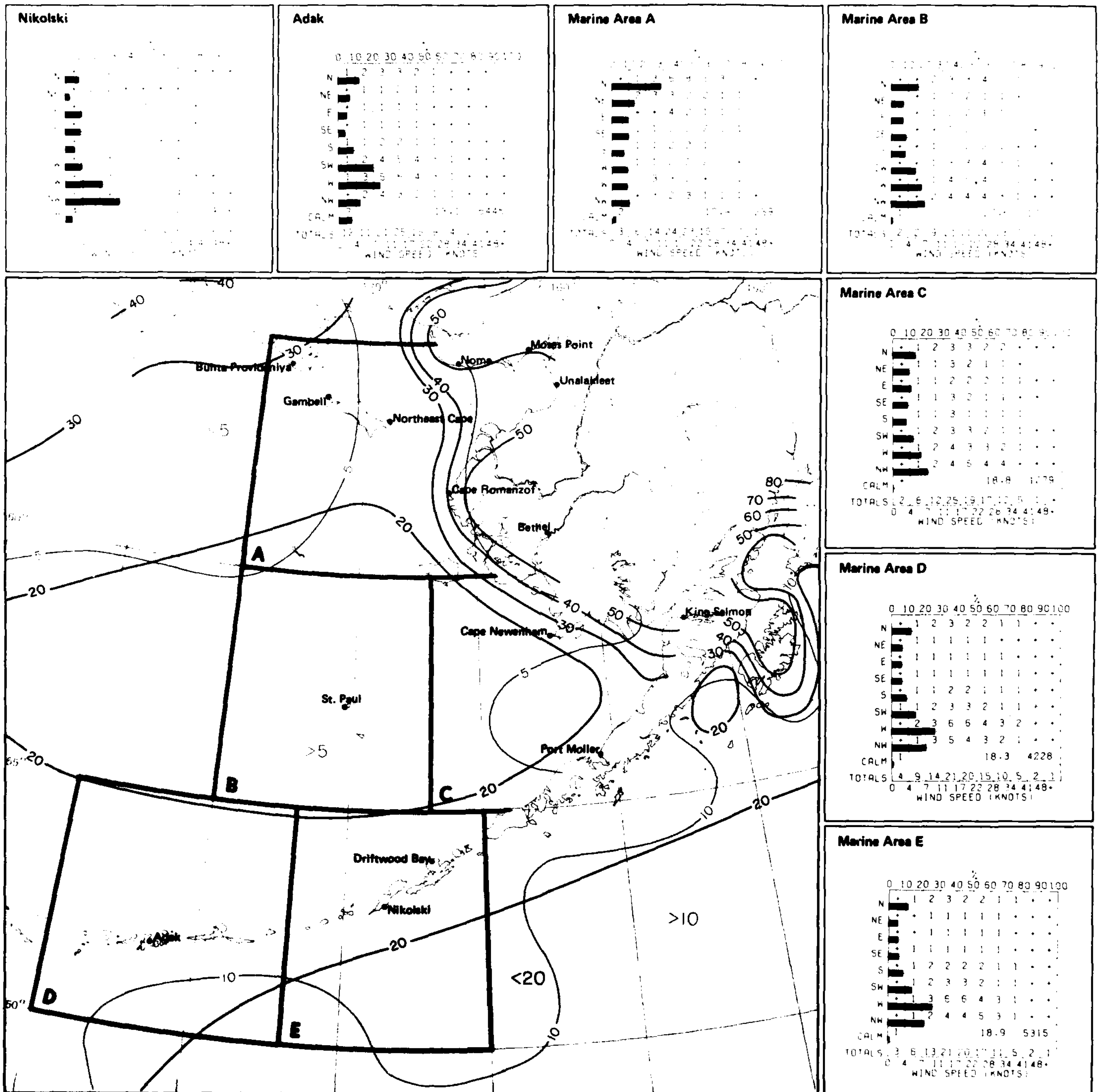


Port Moller



Driftwood Bay

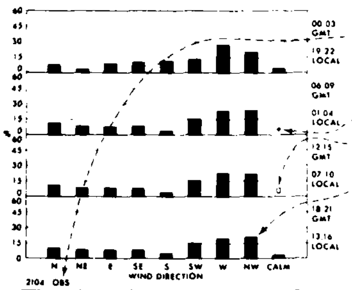




9 Wind speed thresholds

October

Legend **Wind direction/diurnal variation**



Number of observations

Bars show percent frequency of wind direction (8 pts) by hour (GMT and Local Time) Data are based on 100% for each hour group

* indicates < 05% but >0

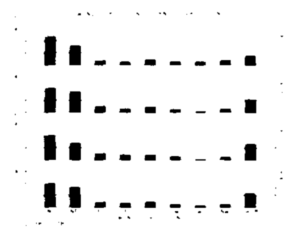
0 indicates no observations in the category

(22% of the wind observations for the hours 18 and 21 GMT (13 and 16 Local Time) had a direction from the northwest)

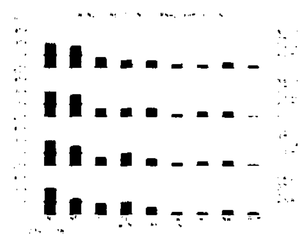
Map - Vector mean wind

10 2 Direction of flow toward station dot, vector magnitude in knots example vector mean wind is from northeast at 10 2 knots or 11 7 mph)

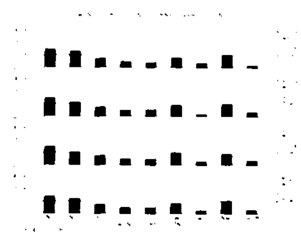
Buhta Provideniya



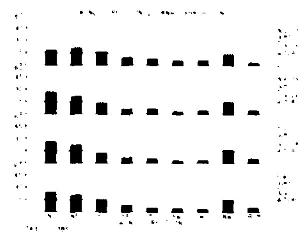
Gambell



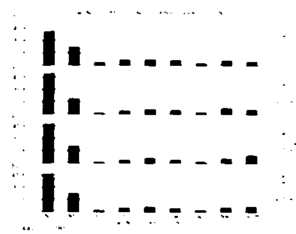
Northeast Cape



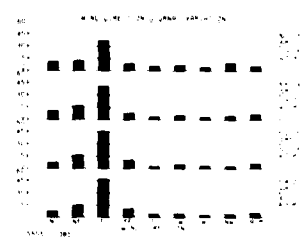
Nome



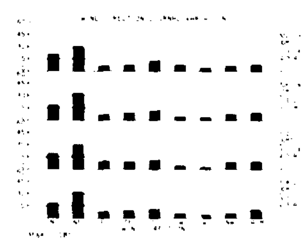
Moses Point



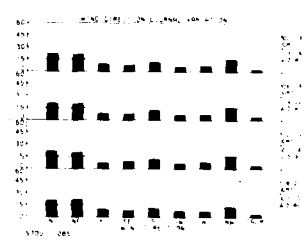
Unalakleet



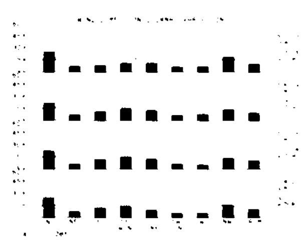
Cape Romanzof



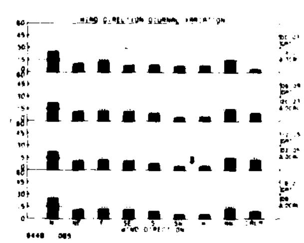
Bethel



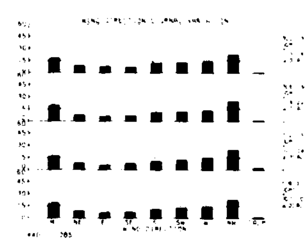
Cape Newenham



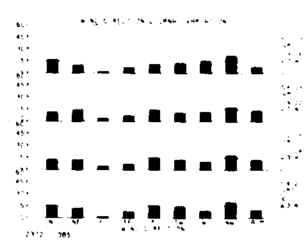
King Salmon



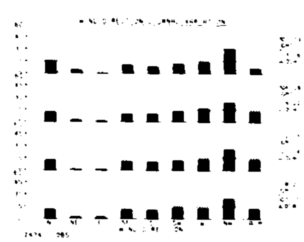
St. Paul

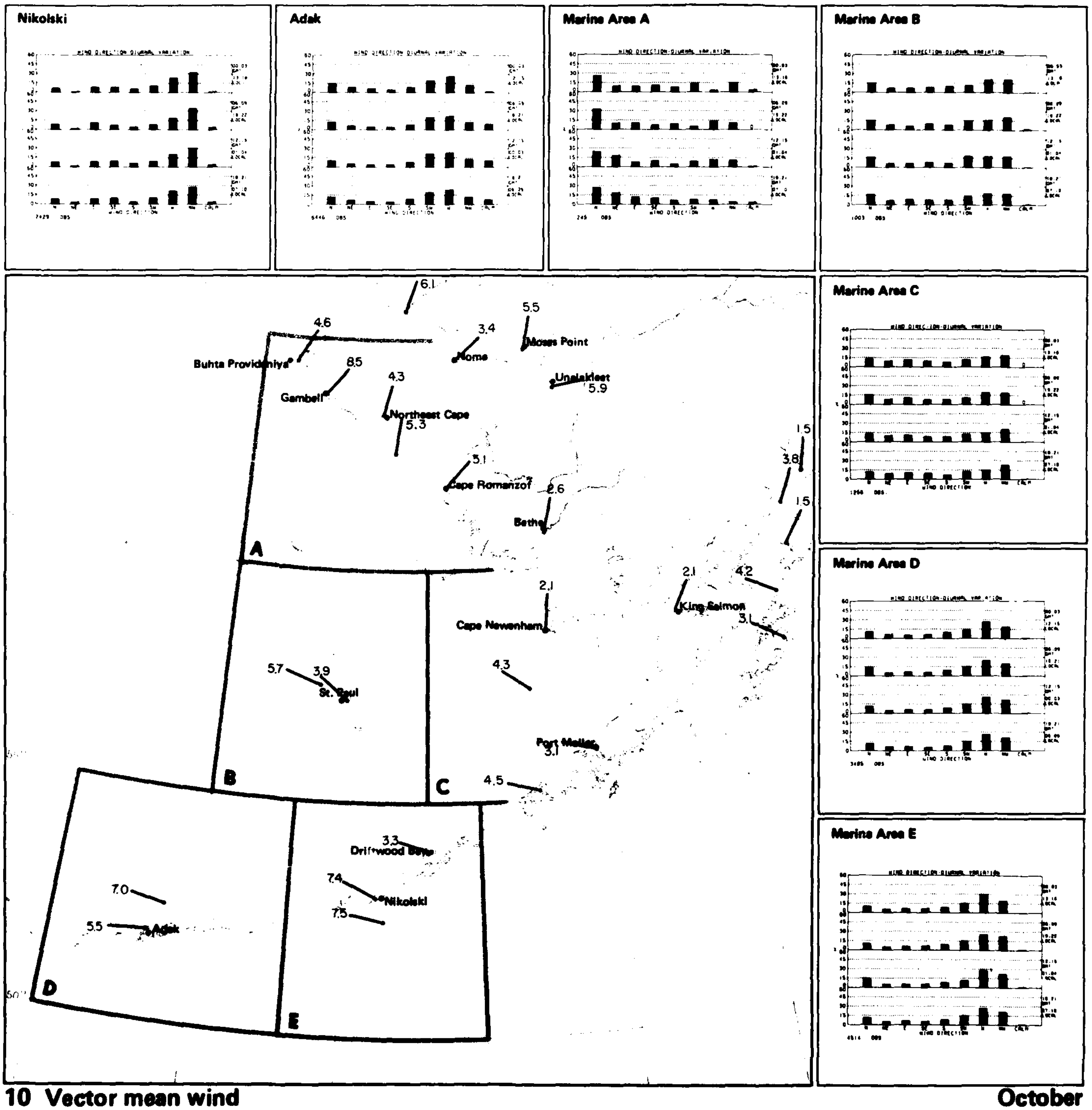


Port Moller



Driftwood Bay

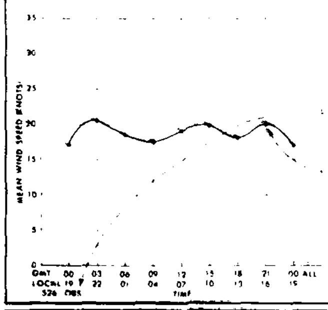




10 Vector mean wind

October

Legend **Wind speed/diurnal variation**



Number of observations

Mean wind speed (knots) by hour (GMT and Local Time) and for all hours

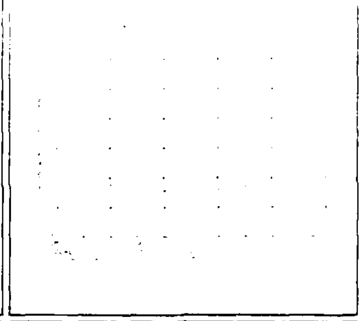
(The mean wind speed for the hour 21 GMT (16 Local) was 20 knots)

Map - Scalar mean wind

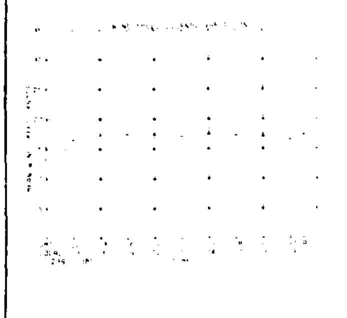
BLACK LINE: Scalar mean wind (knots)

In areas of high persistence of direction the magnitude of the vector mean winds should closely approach that of the scalar mean winds. As most of the marine observations are recorded at six hour intervals, disregard the plots for other than 00 06 12 18 GMT hours on the marine area graphs.

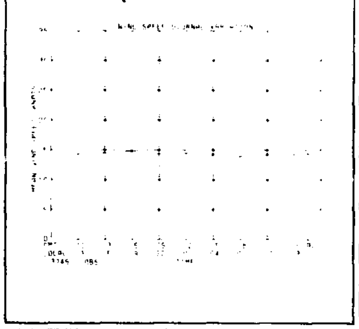
Buhta Provideniya



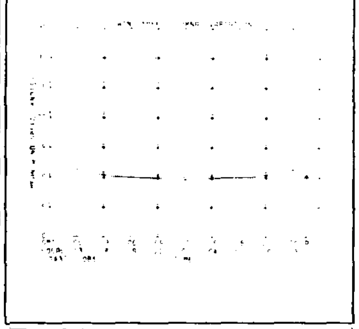
Gambell



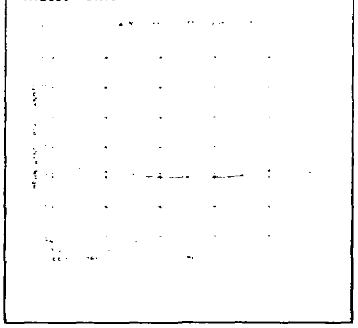
Northeast Cape



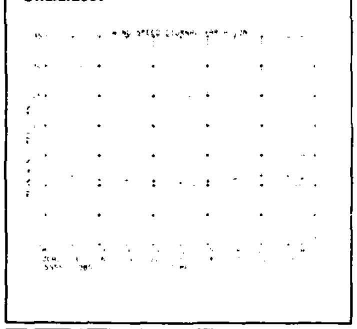
Nome



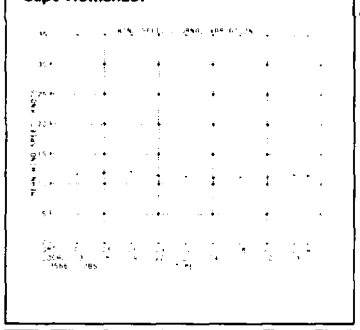
Moses Point



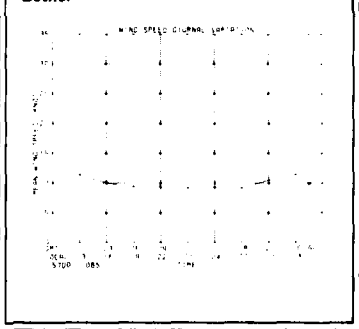
Unalakleet



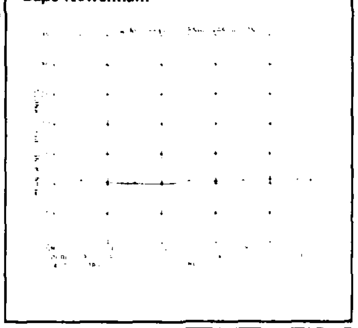
Cape Romanzof



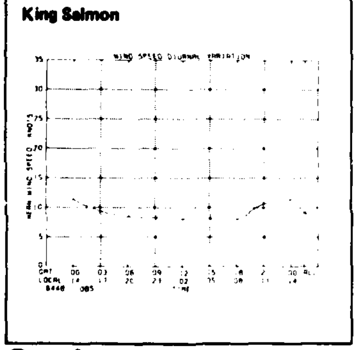
Bethel



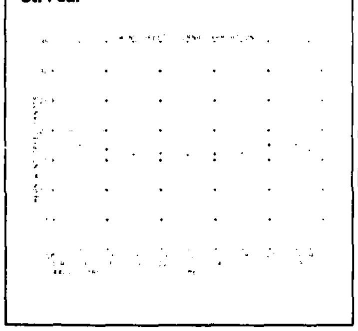
Cape Newenham



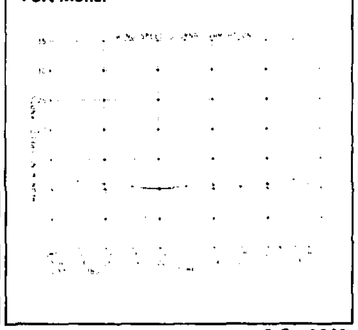
King Salmon



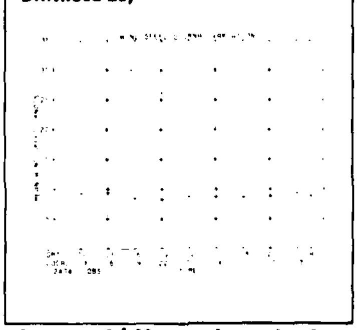
St. Paul



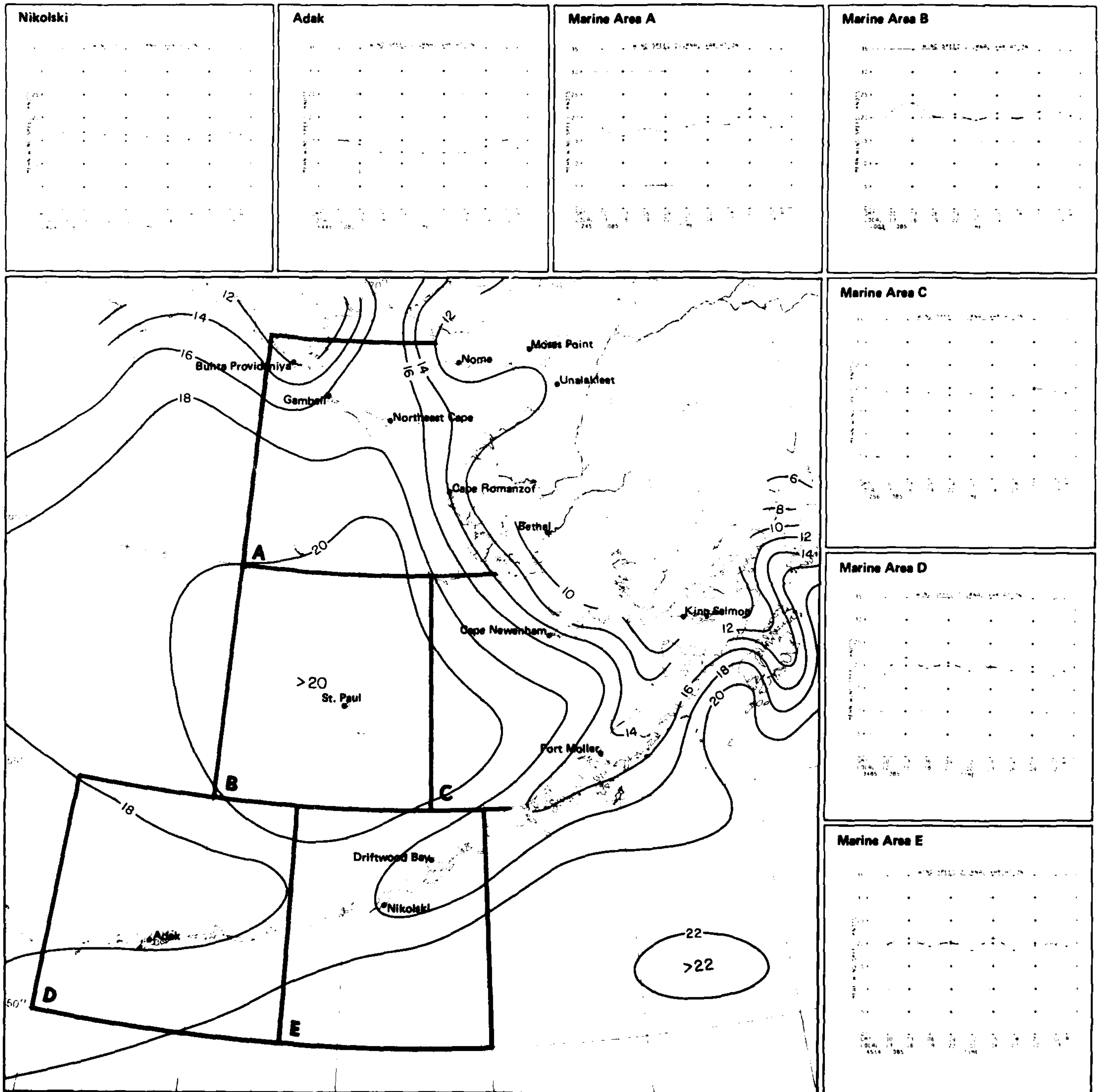
Port Moller



Driftwood Bay



October **11 Wind speed/diurnal variation**

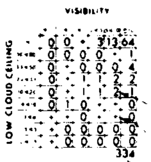


11 Scalar mean wind

October

Legend

Low cloud ceiling/visibility



Percent frequency of simultaneous occurrence of specified low cloud ceilings (hundreds of feet) and visibilities (nautical miles)

Low cloud ceiling heights are estimated from the height of low clouds (h) when low cloud amount (N_h) is ≥5/8

Obscurations are included under ceiling 0<1.5

NC (no ceiling) includes bases of clouds ≥8000 feet as well as occurrences of N_h <5/8

(2% of all observations reported ceiling ≥1000 but <2000 feet simultaneously with visibility ≥5 but <10 nautical miles)

• indicates < 5% but >0

Number of observations

Map - Low cloud ceiling and visibility thresholds

BLACK LINE Percent frequency of low cloud ceiling ≥1000 feet (or no low cloud ceiling) and visibility ≥5 nautical miles

BLUE LINE Percent frequency of low cloud ceiling <600 feet and/or visibility <2 nautical miles

Buhta Provideniya

Gambell

VISIBILITY

LOW CLOUD CEILING	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	[illegible]	•	[illegible]	•	[illegible]	14
50<80	•	[illegible]	[illegible]	[illegible]	•	[illegible]
35<50	[illegible]	[illegible]	[illegible]	[illegible]	•	[illegible]
20<35	0	0	[illegible]	•	5	19
10<20	0	•	•	3	13	12
6<10	0	•	2	[illegible]	8	[illegible]
3<6	0	•	1	1	2	•
1.5<3	0	0	•	0	0	0
0<1.5	1	1	•	•	•	0

1237

Northeast Cape

VISIBILITY

LOW CLOUD CEILING	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	•	•	•	•	6	[illegible]
50<80	[illegible]	[illegible]	[illegible]	[illegible]	•	•
35<50	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
20<35	[illegible]	•	•	[illegible]	[illegible]	[illegible]
10<20	•	•	[illegible]	[illegible]	14	[illegible]
6<10	•	•	[illegible]	•	4	[illegible]
3<6	•	•	[illegible]	[illegible]	•	•
1.5<3	[illegible]	•	[illegible]	[illegible]	•	0
0<1.5	[illegible]	[illegible]	[illegible]	•	0	0

2506

Nome

VISIBILITY

LOW CLOUD CEILING	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	[illegible]	[illegible]	•	•	5	45
50<80	[illegible]	[illegible]	•	•	•	[illegible]
35<50	[illegible]	[illegible]	[illegible]	•	[illegible]	[illegible]
20<35	[illegible]	•	•	[illegible]	5	[illegible]
10<20	•	•	[illegible]	[illegible]	[illegible]	[illegible]
6<10	•	•	[illegible]	[illegible]	3	•
3<6	0	•	[illegible]	[illegible]	•	•
1.5<3	0	•	•	•	•	0
0<1.5	[illegible]	[illegible]	•	•	•	0

7250

Moses Point

VISIBILITY

LOW CLOUD CEILING	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	0	0	[illegible]	[illegible]	•	[illegible]
50<80	0	0	[illegible]	•	[illegible]	[illegible]
35<50	0	0	[illegible]	[illegible]	4	•
20<35	0	[illegible]	•	[illegible]	6	[illegible]
10<20	0	0	[illegible]	3	2	[illegible]
6<10	0	0	[illegible]	•	0	[illegible]
3<6	0	0	0	0	0	[illegible]
1.5<3	0	0	0	0	0	[illegible]
0<1.5	4	•	2	1	•	0

248

Unalakleet

VISIBILITY

LOW CLOUD CEILING	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	[illegible]	[illegible]	•	•	[illegible]	[illegible]
50<80	[illegible]	[illegible]	•	[illegible]	[illegible]	[illegible]
35<50	•	[illegible]	•	•	•	[illegible]
20<35	•	[illegible]	•	•	[illegible]	[illegible]
10<20	•	•	•	•	[illegible]	•
6<10	•	•	•	•	•	•
3<6	[illegible]	•	•	[illegible]	•	•
1.5<3	[illegible]	[illegible]	[illegible]	0	[illegible]	[illegible]
0<1.5	1	[illegible]	1	•	[illegible]	[illegible]

1673

Cape Romanzof

VISIBILITY

LOW CLOUD CEILING	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	0	•	•	1	13	19
50<80	0	•	•	•	1	1
35<50	0	•	0	•	2	2
20<35	•	•	•	1	11	6
10<20	•	1	1	3	14	5
6<10	•	1	1	3	5	1
3<6	•	•	1	2	1	•
1.5<3	0	0	0	•	0	0
0<1.5	1	2	1	•	0	0

2454

Bethel

VISIBILITY

LOW CLOUD CEILING	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	•	•	•	[illegible]	5	41
50<80	•	0	•	•	1	4
35<50	•	•	•	•	2	5
20<35	•	•	•	•	5	9
10<20	•	•	•	2	5	6
6<10	•	•	1	2	3	2
3<6	•	•	•	1	1	•
1.5<3	•	•	•	•	•	0
0<1.5	1	1	1	•	•	0

5679

Cape Newenham

VISIBILITY

LOW CLOUD CEILING	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	0	0	0	•	11	13
50<80	0	0	0	0	•	[illegible]
35<50	0	0	0	•	2	2
20<35	0	0	0	1	9	9
10<20	•	•	•	3	12	11
6<10	•	•	1	6	6	3
3<6	0	•	[illegible]	2	2	•
1.5<3	0	•	0	•	0	0
0<1.5	1	2	1	•	0	0

2498

King Salmon

VISIBILITY

LOW CLOUD CEILING	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	1	•	•	1	8	45
50<80	•	0	0	•	1	4
35<50	•	0	•	•	2	5
20<35	•	•	•	1	5	10
10<20	0	•	•	1	4	4
6<10	0	•	•	1	2	1
3<6	•	•	•	1	1	•
1.5<3	•	•	•	•	•	•
0<1.5	1	•	•	•	•	0

6374

St. Paul

VISIBILITY

LOW CLOUD CEILING	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	0	0	•	1	19	7
50<80	0	0	0	0	1	•
35<50	0	•	0	0	2	1
20<35	0	•	•	1	14	6
10<20	•	•	•	4	24	4
6<10	0	•	1	3	5	1
3<6	•	•	2	1	1	•
1.5<3	•	•	•	•	•	0
0<1.5	1	•	•	•	0	0

4214

Port Moller

Insufficient Data

Driftwood Bay

Insufficient Data

Nikolski

Insufficient Data

Adak

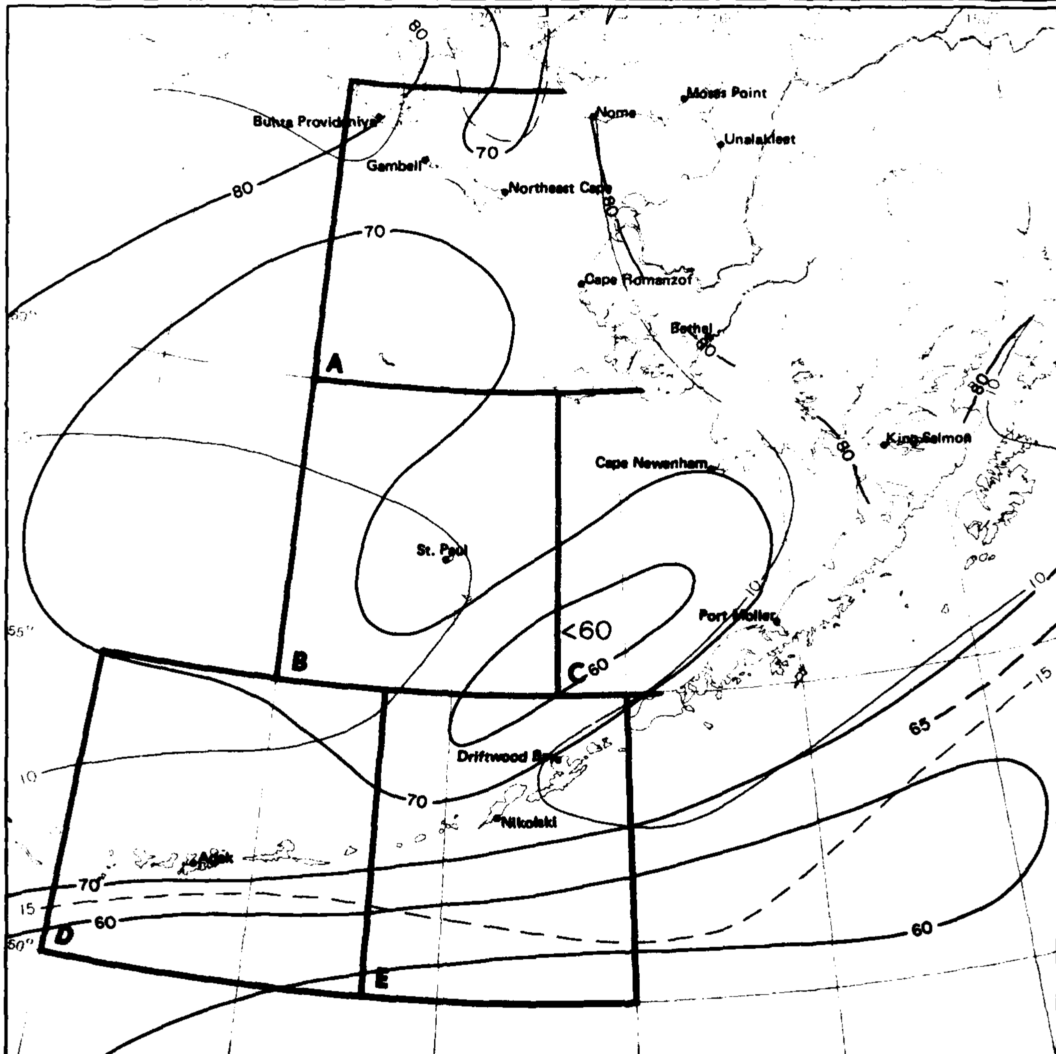
VISIBILITY

LOW CLOUD CEILING	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	1	•	•	1	16	4
50<80	0	0	0	•	1	•
35<50	0	0	0	•	5	1
20<35	•	•	•	2	27	3
10<20	[illegible]	•	1	[illegible]	23	1
6<10	0	•	1	3	3	•
3<6	•	•	1	2	1	•
1.5<3	[illegible]	0	•	•	•	0
0<1.5	•	•	•	•	0	0

6437

Marine Area A

Marine Area B



Marine Area C

VISIBILITY

LOW CLOUD CEILING	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	•	[illegible]	•	1	[illegible]	[illegible]
50<80	[illegible]	1	[illegible]	•	•	•
35<50	[illegible]	[illegible]	[illegible]	•	[illegible]	[illegible]
20<35	[illegible]	[illegible]	•	4	[illegible]	[illegible]
10<20	•	•	1	4	[illegible]	1
6<10	0	1	1	•	[illegible]	4
3<6	[illegible]	•	•	1	1	•
1.5<3	0	0	0	0	[illegible]	•
0<1.5	1	1	2	1	•	•

1044

Marine Area D

VISIBILITY

LOW CLOUD CEILING	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	•	•	0	2	6	22
50<80	0	0	0	•	•	1
35<50	•	0	0	•	1	2
20<35	0	•	•	1	5	8
10<20	•	•	1	3	8	12
6<10	•	•	1	4	7	5
3<6	•	•	•	1	2	1
1.5<3	•	•	•	•	•	•
0<1.5	2	1	1	1	1	•

3126

Marine Area E

VISIBILITY

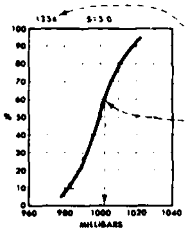
LOW CLOUD CEILING	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	•	•	0	1	7	21
50<80	0	0	0		•	1
35<50	0	0	•	•	1	4
20<35	0	0	•	1	4	8
10<20	•	•	1	4	9	11
6<10	•	•	1	4	6	5
3<6	•	•	•	2	2	1
1.5<3	0	•	•	•	•	•
0<1.5	1	1	1	1	1	•

3885

12 Low cloud ceiling and visibility thresholds **October**

Legend

Sea level pressure



Number of observations

Cumulative percent frequency of sea level pressures equal to or less than the pressure intersected by the curve

S Standard deviation of pressure (mbs)

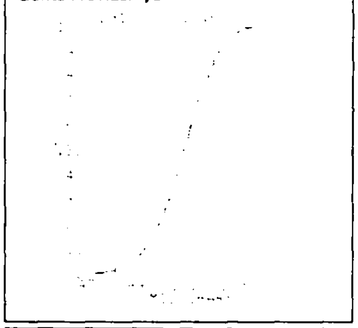
(60% of all observed sea level pressures were ≤1002 millibars.)

Map · Mean sea level pressure

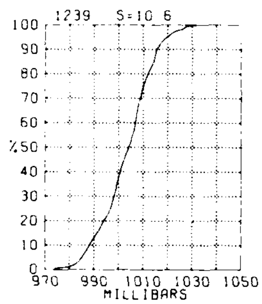
BLACK LINE · Mean sea level pressure (millibars)

Sea level pressure is one of the most frequently recorded elements but one of the least accurate because of instrument and coding errors. Despite the inaccuracies of the individual readings, however, the large-scale patterns and mean gradients of the isopleth analyses are relatively accurate.

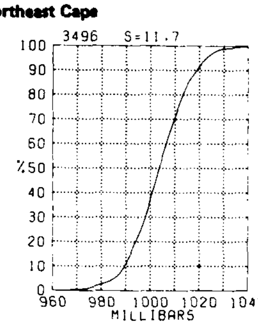
Buhta Provideniya



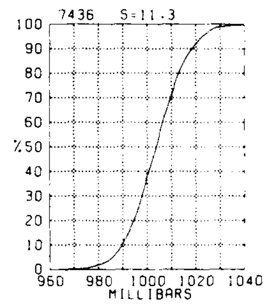
Gambell



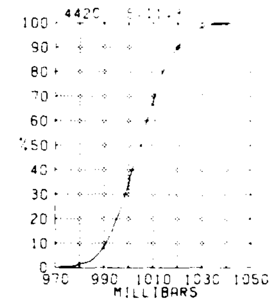
Northeast Cape



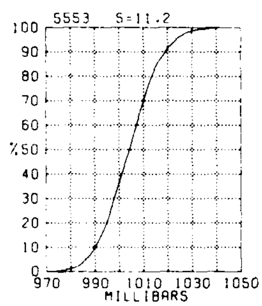
Nome



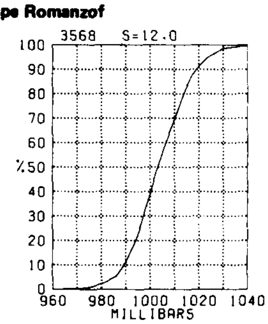
Moses Point



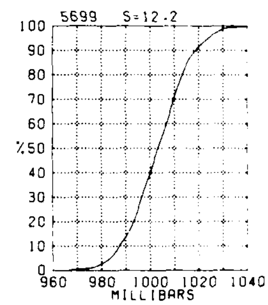
Unalakleet



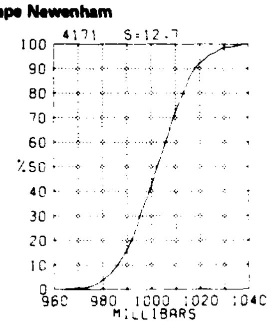
Cape Romanzof



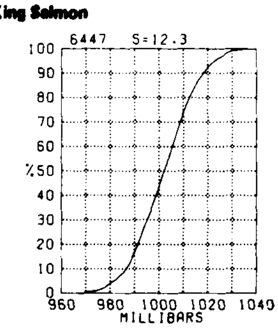
Bethel



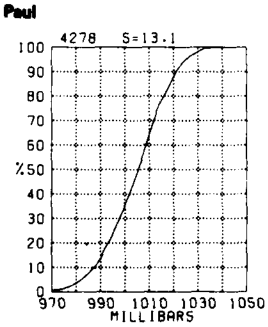
Cape Newenham



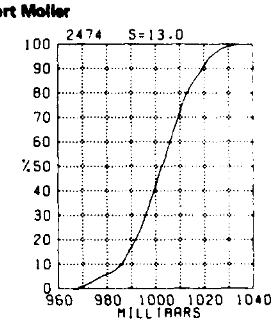
King Salmon



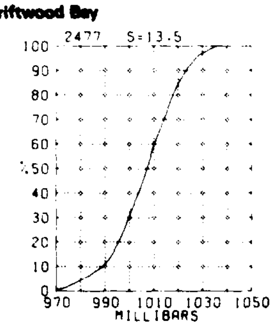
St. Paul

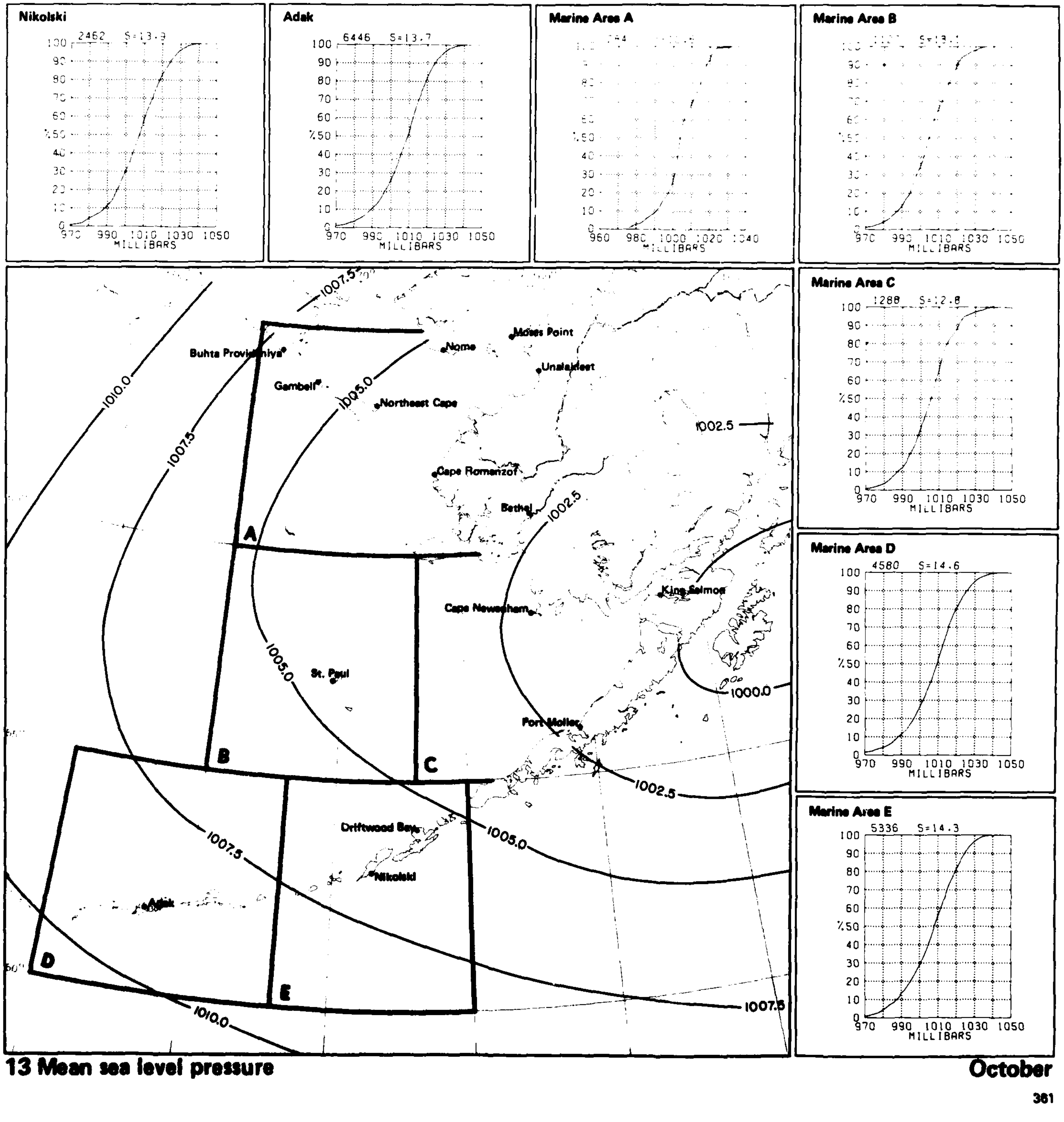


Port Moller



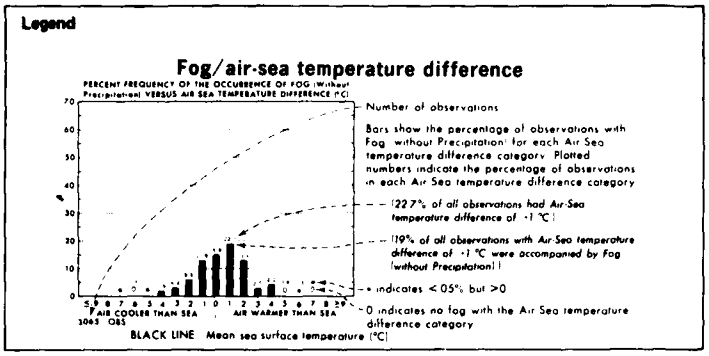
Driftwood Bay

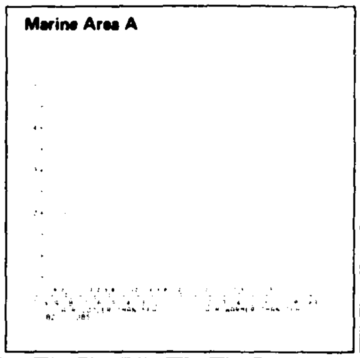


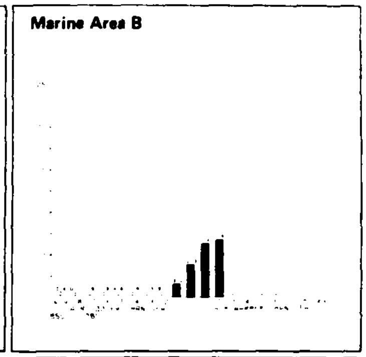


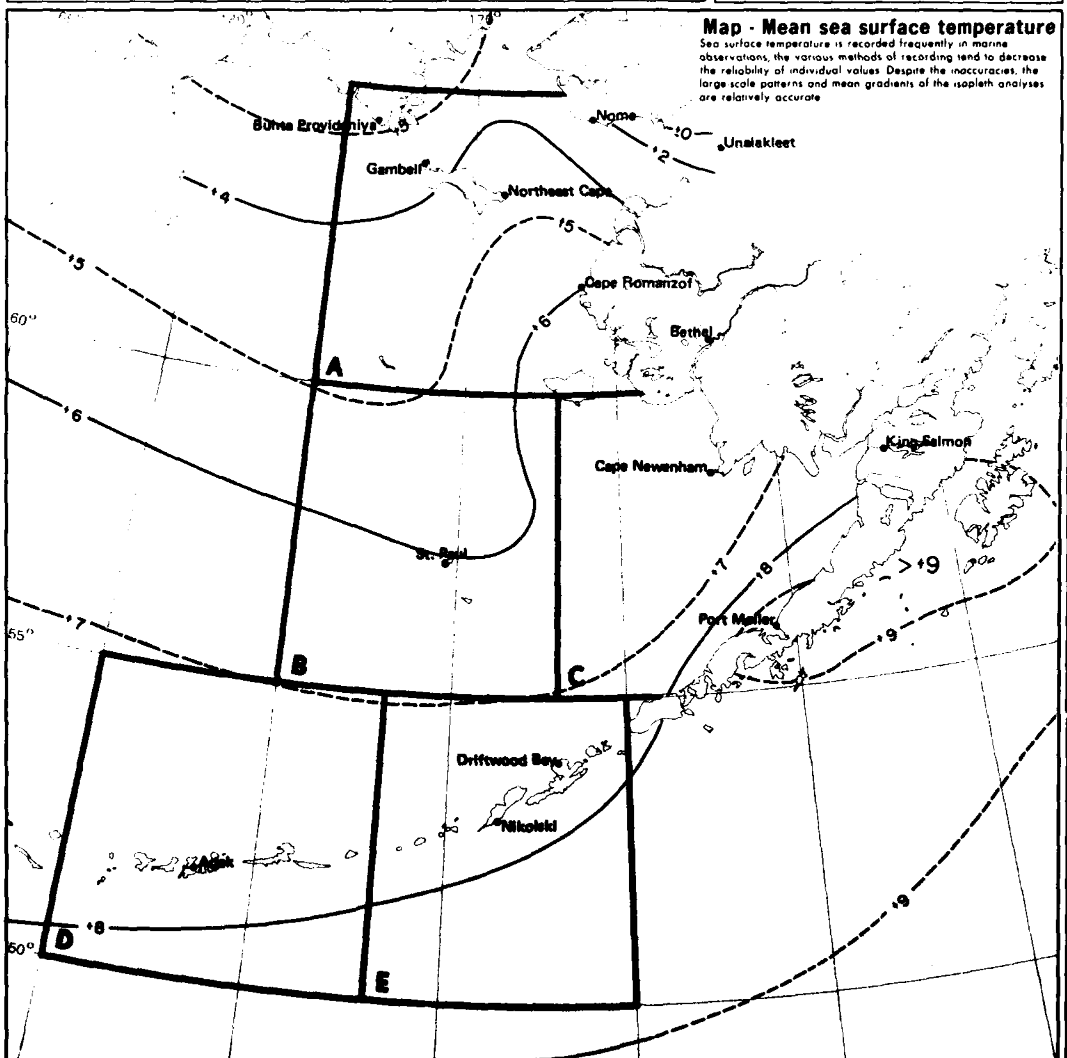
13 Mean sea level pressure

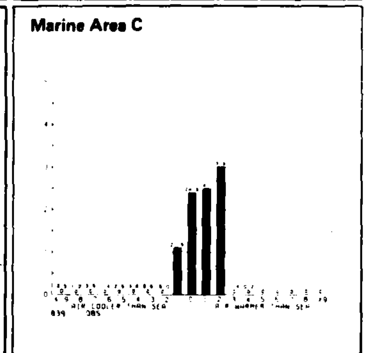
October

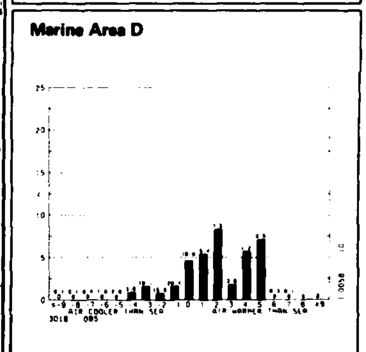


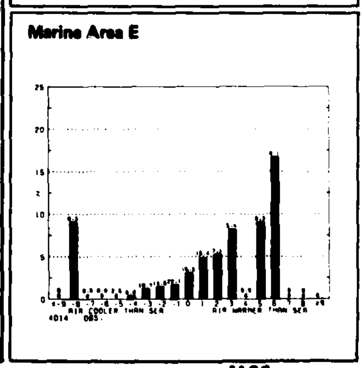








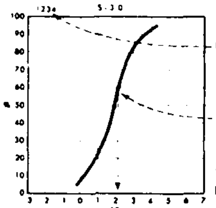




14 Fog/air-sea temperature difference
Mean sea surface temperature

Legend

Sea surface temperature



Number of observations

Cumulative percent frequency of sea surface temperatures equal to or less than the temperature intersected by the curve

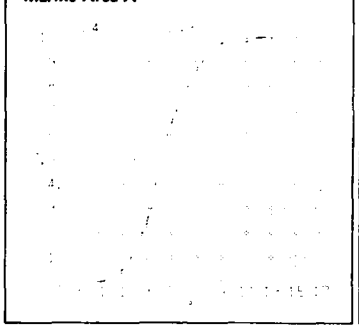
(60% of all observed sea surface temperatures were ≤2.1°C or ≤35.8°F)

S Standard deviation of sea surface temperatures (°C)

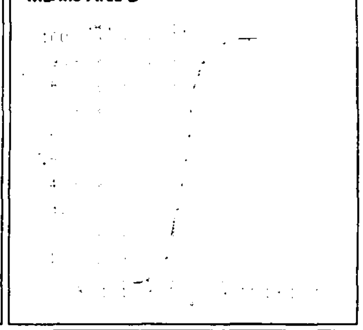
BLACK LINE Maximum (99%) sea surface temperature (°C) (1% of the temperatures were greater than the given value)

BLUE LINE Minimum (1%) sea surface temperature (°C) (1% of the temperatures were equal to or less than the given value)

Marine Area A

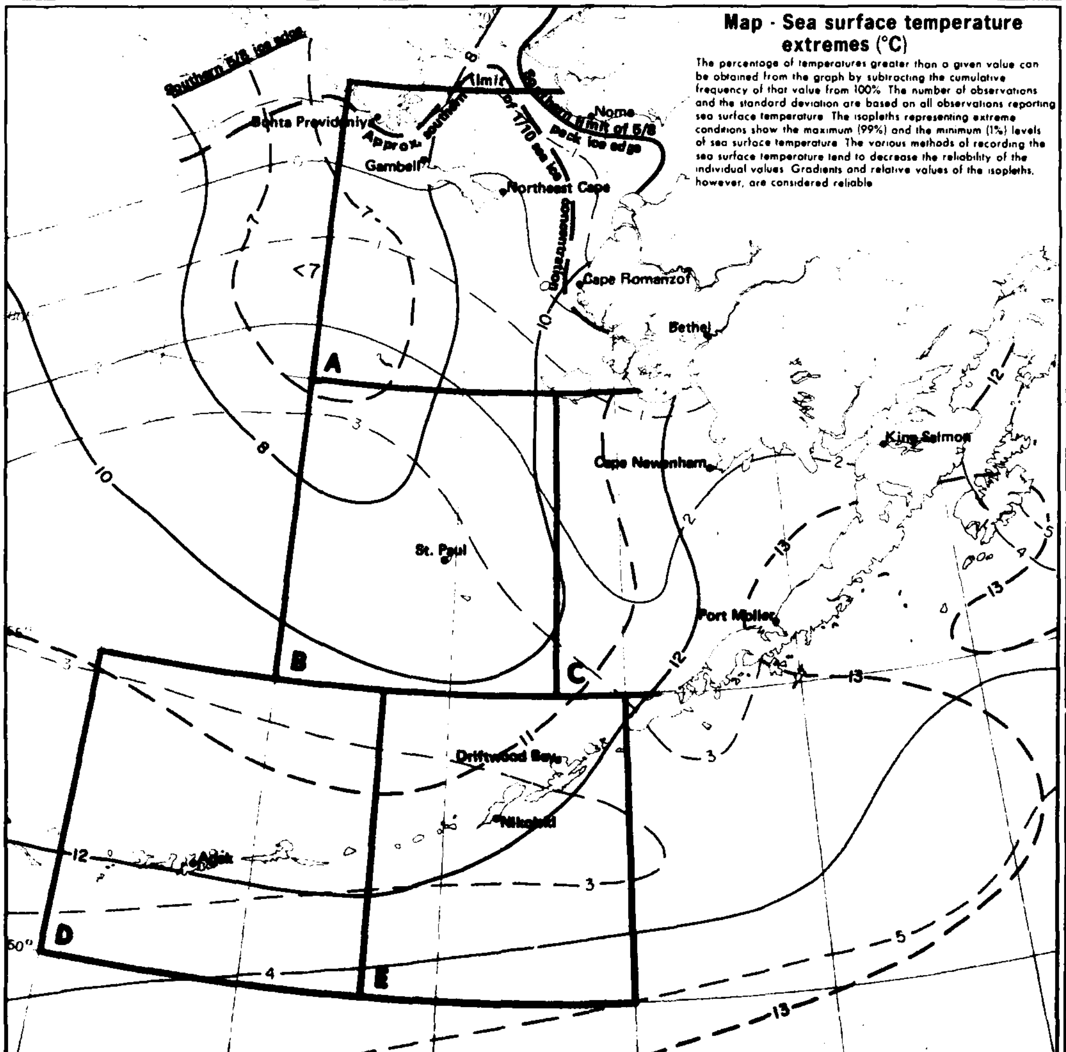


Marine Area B

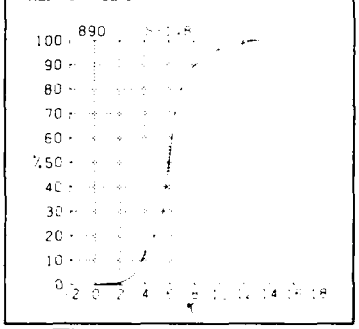


Map - Sea surface temperature extremes (°C)

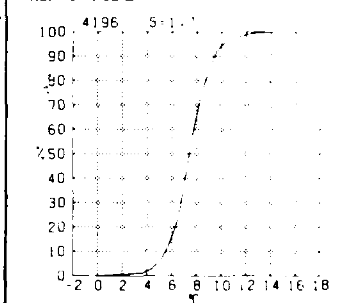
The percentage of temperatures greater than a given value can be obtained from the graph by subtracting the cumulative frequency of that value from 100%. The number of observations and the standard deviation are based on all observations reporting sea surface temperature. The isopleths representing extreme conditions show the maximum (99%) and the minimum (1%) levels of sea surface temperature. The various methods of recording the sea surface temperature tend to decrease the reliability of the individual values. Gradients and relative values of the isopleths, however, are considered reliable.



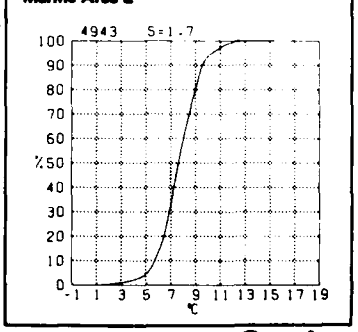
Marine Area C



Marine Area D



Marine Area E



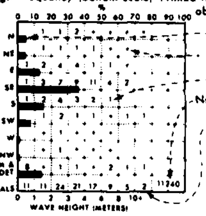
15 Sea surface temperature extremes **October**

Legend

Wave height/direction

Direction frequency (top scale) Bars represent percent frequency of waves from each direction

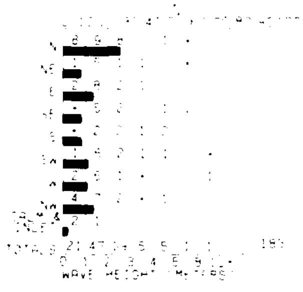
Height frequency (bottom scale) Printed figures represent percent frequency of wave heights observed from each direction



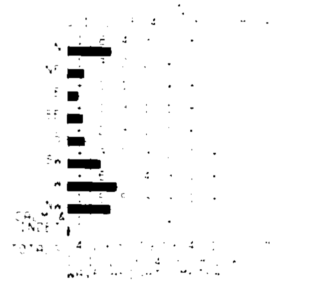
BLACK LINE - Percent frequency of wave height <1.5 meters (<5 feet)

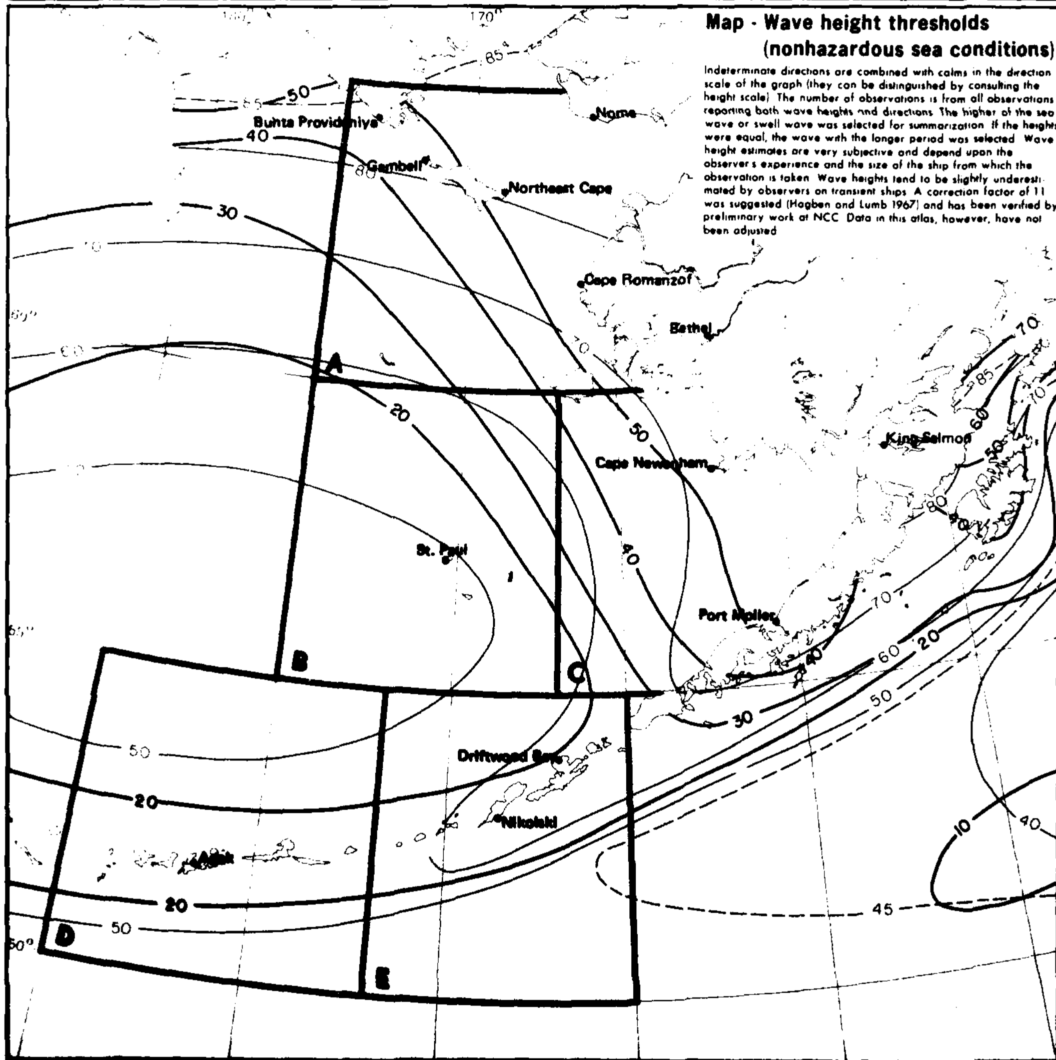
BLUE LINE - Percent frequency of wave height <2.5 meters (<8 feet)

Marine Area A



Marine Area B

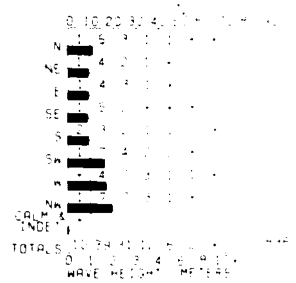




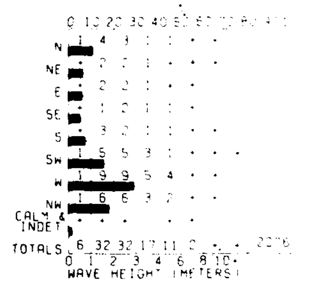
Map - Wave height thresholds (nonhazardous sea conditions)

Indeterminate directions are combined with calms in the direction scale of the graph (they can be distinguished by consulting the height scale). The number of observations is from all observations reporting both wave heights and directions. The higher of the sea wave or swell wave was selected for summarization. If the heights were equal, the wave with the longer period was selected. Wave height estimates are very subjective and depend upon the observer's experience and the size of the ship from which the observation is taken. Wave heights tend to be slightly underestimated by observers on transient ships. A correction factor of 1.1 was suggested (Hogben and Lumb 1967) and has been verified by preliminary work at NCC. Data in this atlas, however, have not been adjusted.

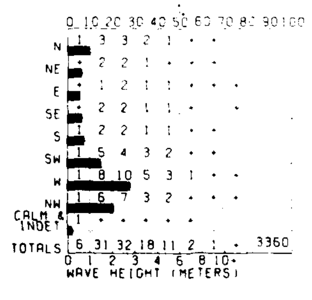
Marine Area C



Marine Area D

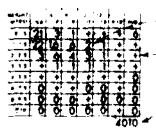


Marine Area E



Legend

Wave height/period



Percent frequency of occurrence of wave period and height

(2% of observed waves had a height of 1 1.5 meters and a period of 10-11 seconds)

· indicates < 5% but >0

Number of observations

Waves are selected on the basis of the higher of sea and swell when both are reported. If both heights are equal, the wave with the longer period is selected.

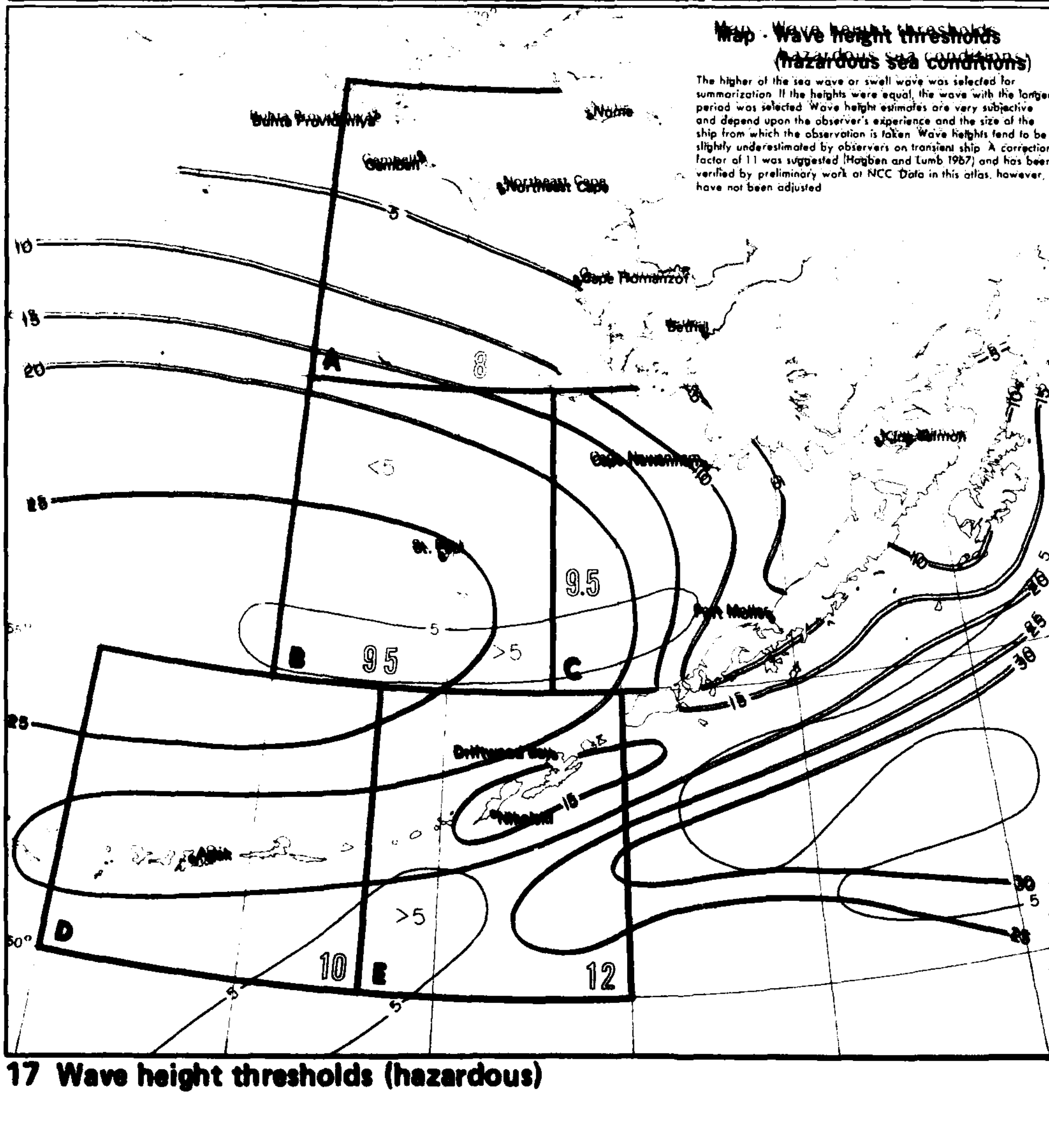
BLACK LINE	Percent frequency of wave height ≥3.5 meters (≥12 feet)
BLUE LINE	Percent frequency of wave height ≥6 meters (≥20 feet)
BLUE NUMBER	Maximum observed wave height (meters)

Marine Area A

Marine Area B

Map - Wave height thresholds (hazardous sea conditions)

The higher of the sea wave or swell wave was selected for summarization. If the heights were equal, the wave with the longer period was selected. Wave height estimates are very subjective and depend upon the observer's experience and the size of the ship from which the observation is taken. Wave heights tend to be slightly underestimated by observers on transient ship. A correction factor of 1.1 was suggested (Hogben and Lumb 1967) and has been verified by preliminary work at NCC. Data in this atlas, however, have not been adjusted.



Marine Area C

644

Marine Area D

2094

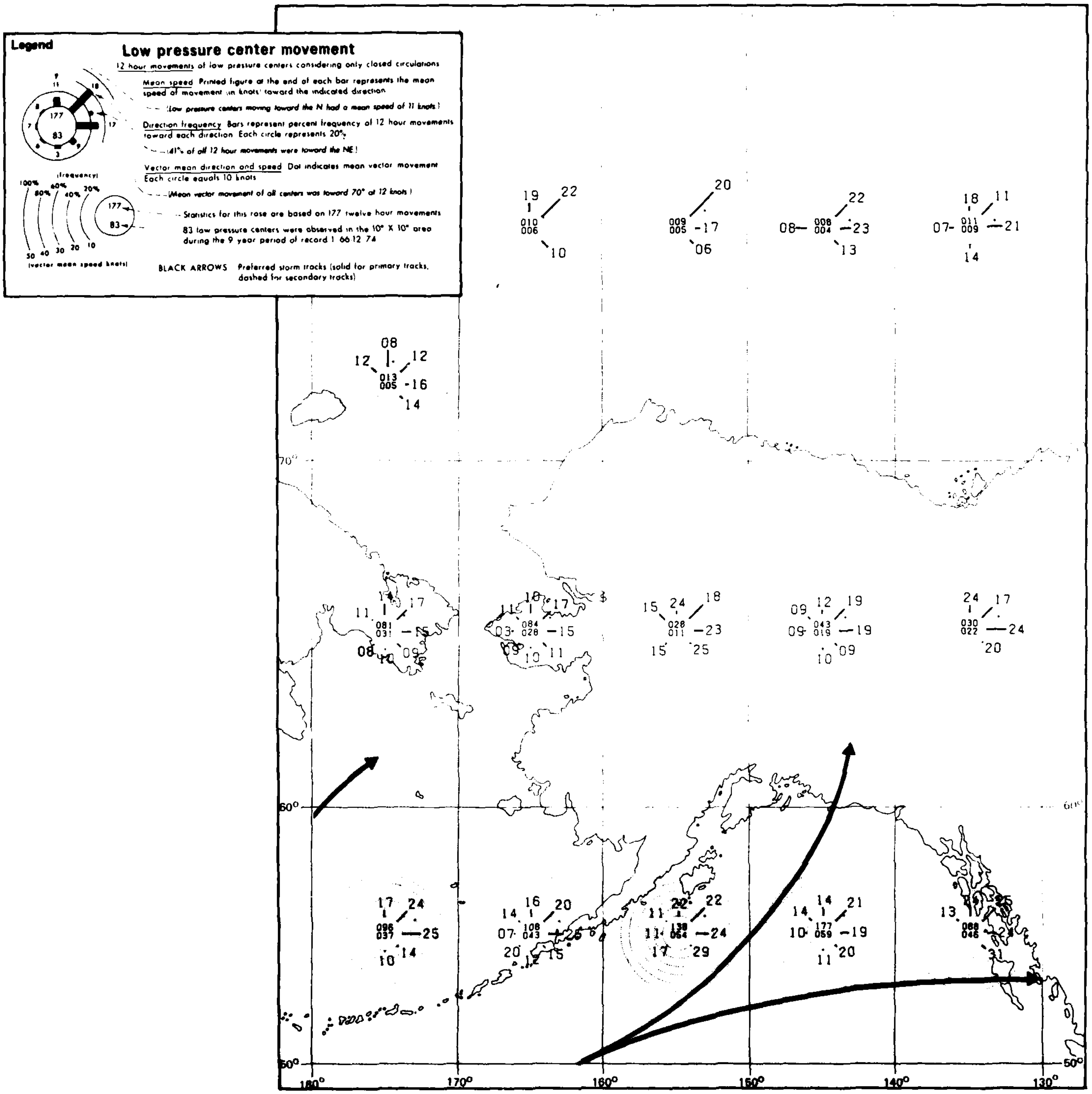
Marine Area E

PERIOD SECONDS

3407

17 Wave height thresholds (hazardous)

October

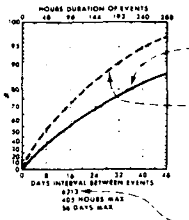


October

18 Low pressure center movement

Legend

Persistence of visibility <2 n. mi.



Hours duration of events Days interval between events

Cumulative percent frequency of hours duration equal to or less than the number of hours intersected by the solid curve

(80% of the events had a duration ≤216 hours.)

Cumulative percent frequency of days interval between events equal to or less than the number of days intersected by the broken curve

(88% of the events were followed by another event in 28 days or less.)

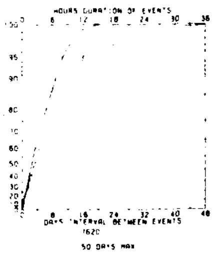
The maximum value(s) of hours duration and/or the days interval will be displayed when the graph limits are exceeded

Durations and intervals for a particular month extend from the time they begin (or the first of the month if already in progress) and are terminated at the actual ending time, regardless of what month that may be

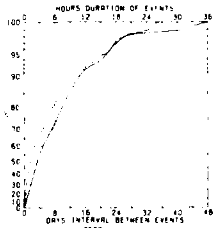
Number of observations

Top and bottom scales are variable to allow for variations in the data

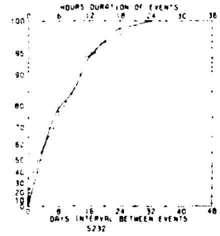
Adak



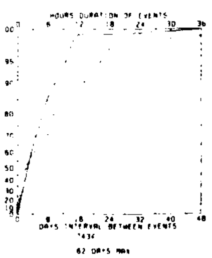
Nome



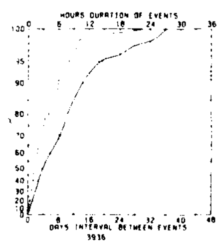
Moses Point



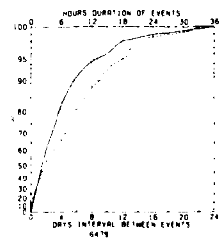
Unalakleet



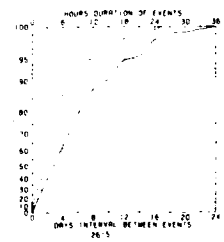
Cape Romanzof



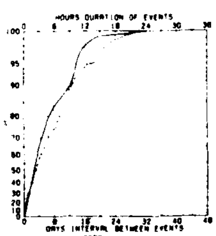
Bethel



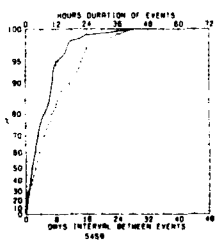
Nikolski



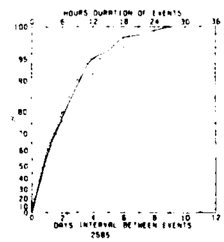
King Salmon



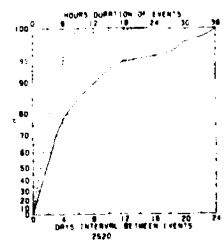
St. Paul



Port Moller



Driftwood Bay

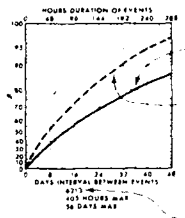


19 Persistence of visibility <2 n. mi. **October**

Legend

Persistence of wind ≥10 kts.

Hours duration of events   Days interval between events



Cumulative percent frequency of hours duration equal to or less than the number of hours intersected by the solid curve

(80% of the events had a duration ≤216 hours.)

Cumulative percent frequency of days interval between events equal to or less than the number of days intersected by the broken curve

(88% of the events were followed by another event in 28 days or less

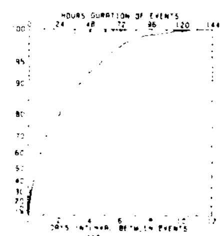
The maximum value(s) of hours duration and or the days interval will be displayed when the graph limits are exceeded

Durations and intervals for a particular month extend from the time they begin (or the first of the month if already in progress) and are terminated at the actual ending time, regardless of what month that may be

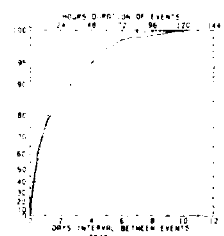
Number of observations

Top and bottom scales are variable to allow for variations in the data

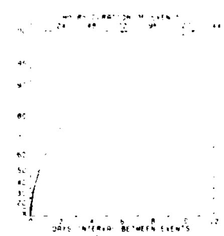
Adak



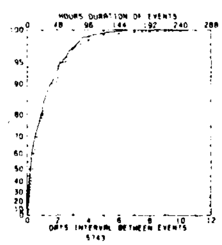
Nome



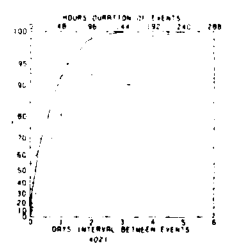
Moses Point



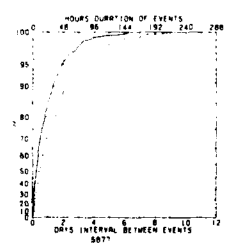
Unalakleet



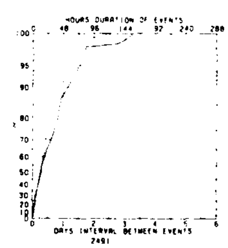
Cape Romanzof



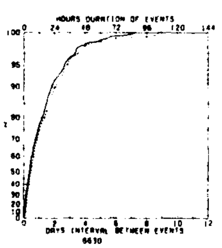
Bethel



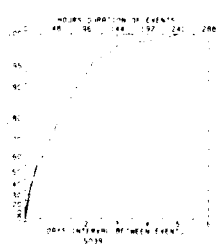
Nikolski



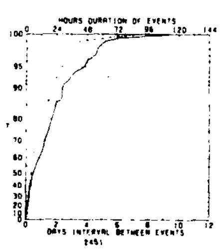
King Salmon



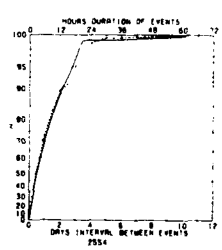
St. Paul



Port Moller

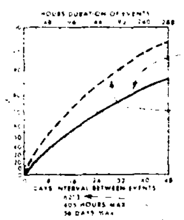


Driftwood Bay



Legend

Persistence of wind ≥20 kts.



Hours duration of events   Days interval between events

Cumulative percent frequency of hours duration equal to or less than the number of hours intersected by the solid curve

80% of the events had a duration ≤216 hours

Cumulative percent frequency of days interval between events equal to or less than the number of days intersected by the broken curve

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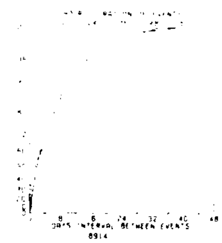
Number of observations

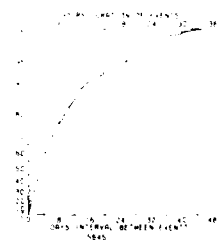
Top and bottom scales are variable to allow for variations in the data

Adak

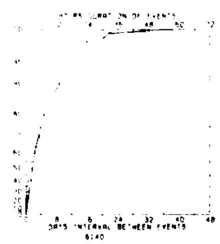
Nome



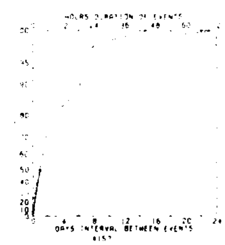
Moses Point



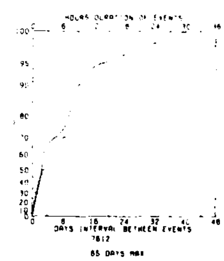
Unalakleet



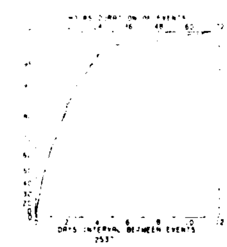
Cape Romanzof



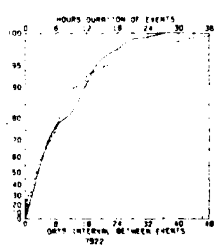
Bethel



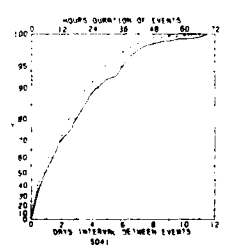
Nikolski



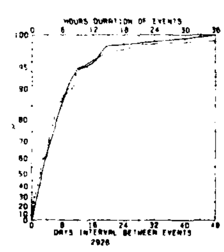
King Salmon



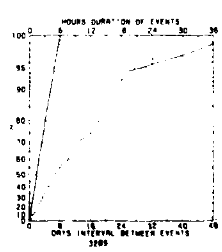
St. Paul



Port Moller



Driftwood Bay

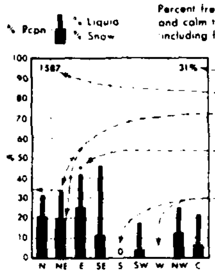


21 Persistence of wind ≥20 kts. **October**

Legend

Precipitation/wind direction

Percent frequency of surface wind observations from each direction and calm that were accompanied by precipitation subdivided into liquid type including freezing rain and freezing drizzle and snow



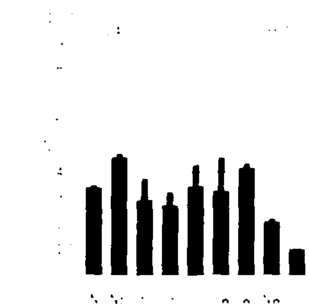
- Percentage of present weather observations reporting precipitation
- Number of observations
- *34% of all NE winds were accompanied by precipitation, of which 14% was liquid and 20% was snow*
- An asterisk in the column for a given direction or calm indicates that the percentage was based on 10-30 observations of present weather and wind direction
- 0 replaces bar when no precipitation was observed with winds from a given direction or calm. No bar graph is presented if less than 10 observations containing present weather were reported for a given direction or calm

Map · Precipitation

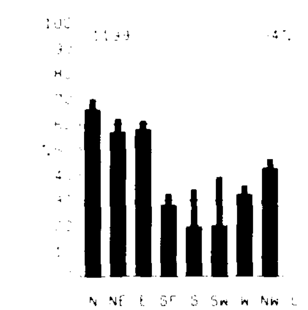
BLACK LINE Percent frequency of observations reporting precipitation

Of all the elements recorded in historical marine observations, precipitation is one of those most subject to interpretation error from coding practices, observers preference for certain present weather codes and other biases

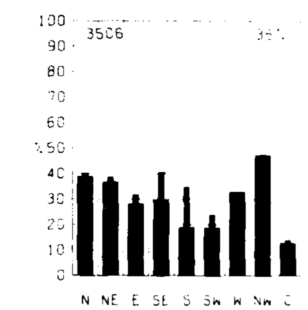
Buhta Provideniya



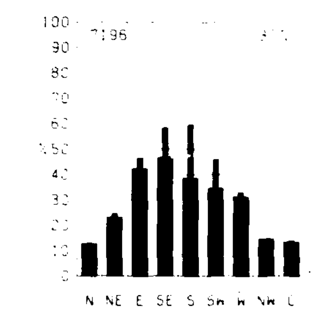
Gambell



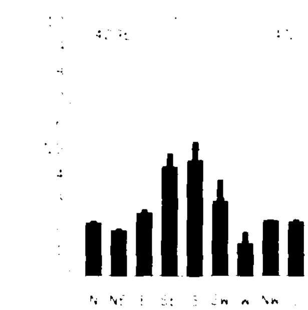
Northeast Cape



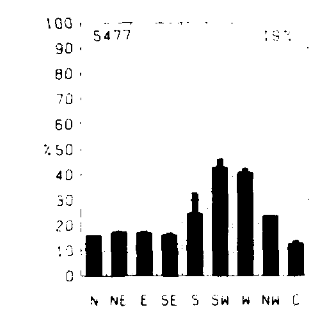
Nome



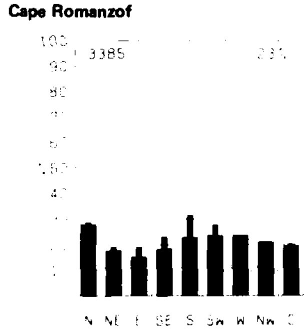
Moses Point



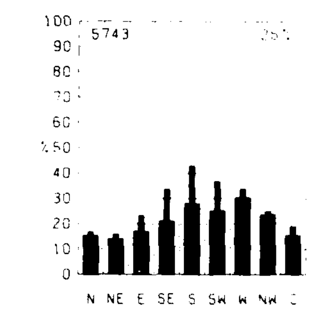
Unalakleet



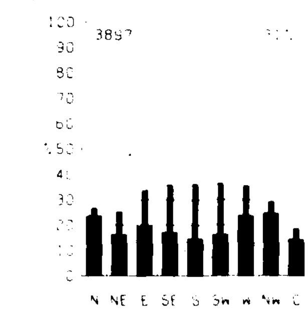
Cape Romanzof



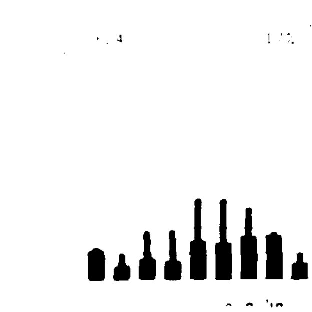
Bethel



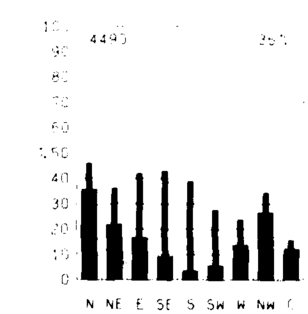
Cape Newenham



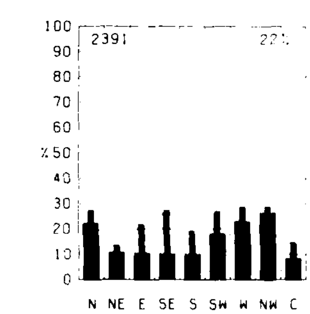
King Salmon



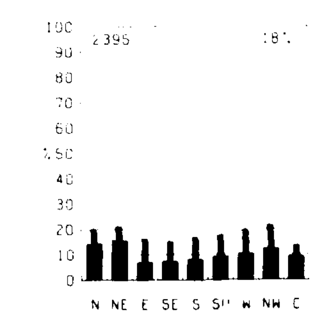
St. Paul

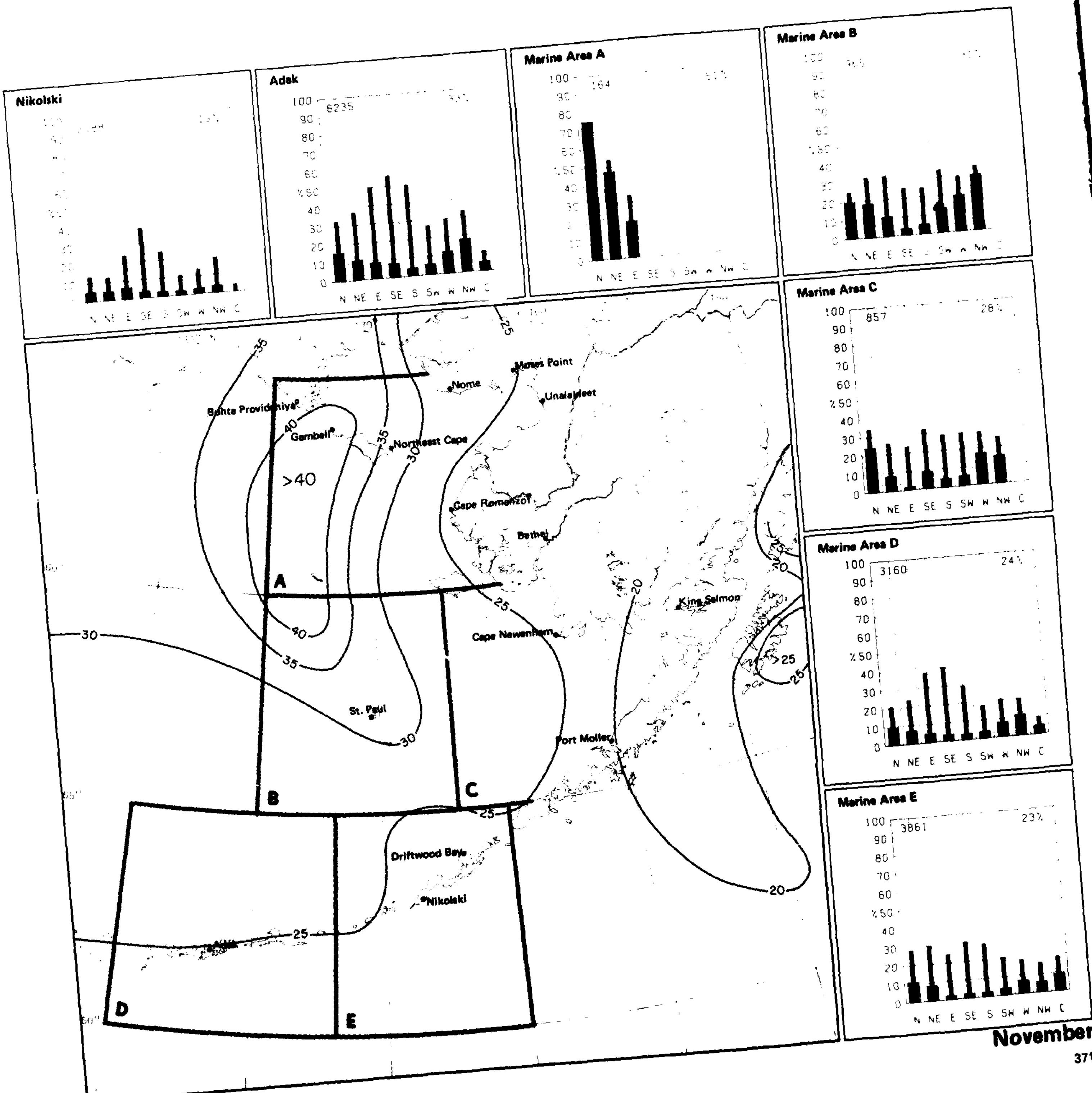


Port Moller



Driftwood Bay

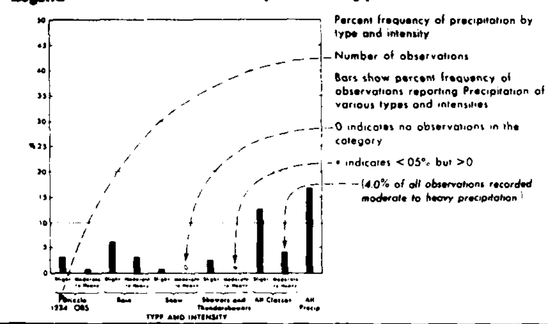




November

1 Precipitation

Legend **Precipitation types**

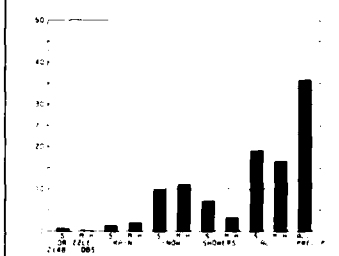


Map · Snow

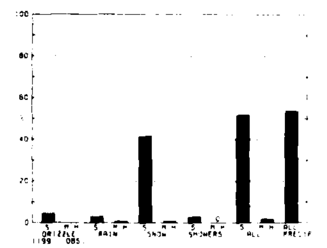
BLACK LINE Percent frequency of precipitation observations reporting snow

The percent frequency of observations reporting snow for a given point can be determined by multiplying the percent frequency of observations reporting precipitation (map 1) with that of precipitation observations reporting snow (map 2)

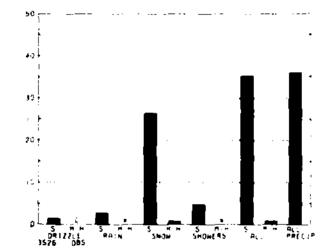
Buhta Provideniya



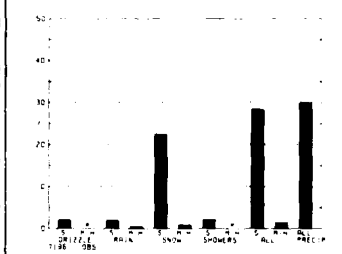
Gambell



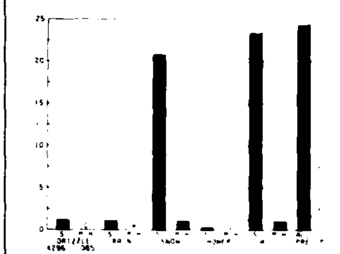
Northeast Cape



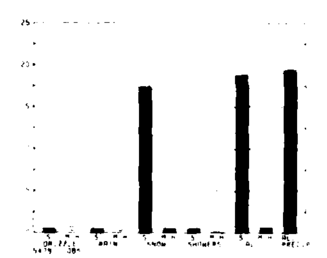
Nome



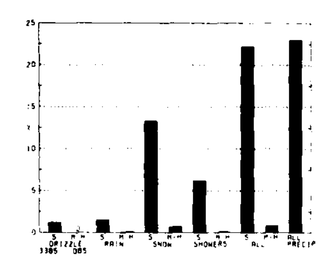
Moses Point



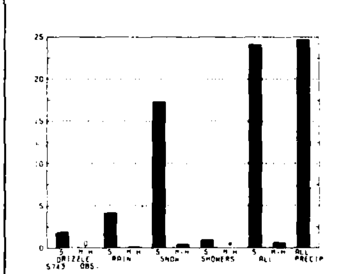
Unalakleet



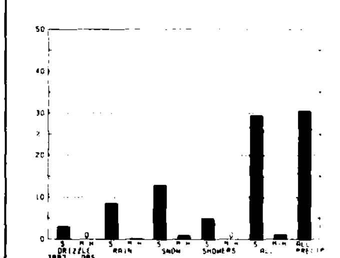
Cape Romanzof



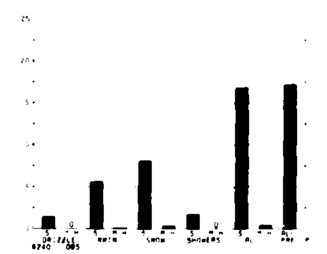
Bethel



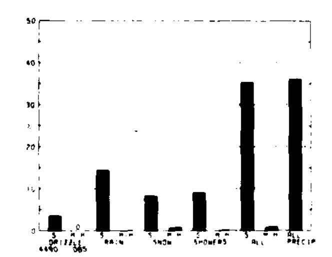
Cape Newenham



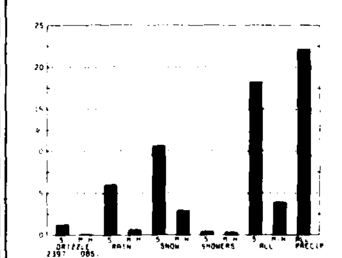
King Salmon



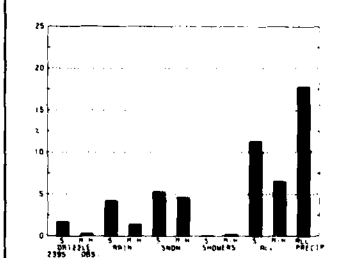
St. Paul

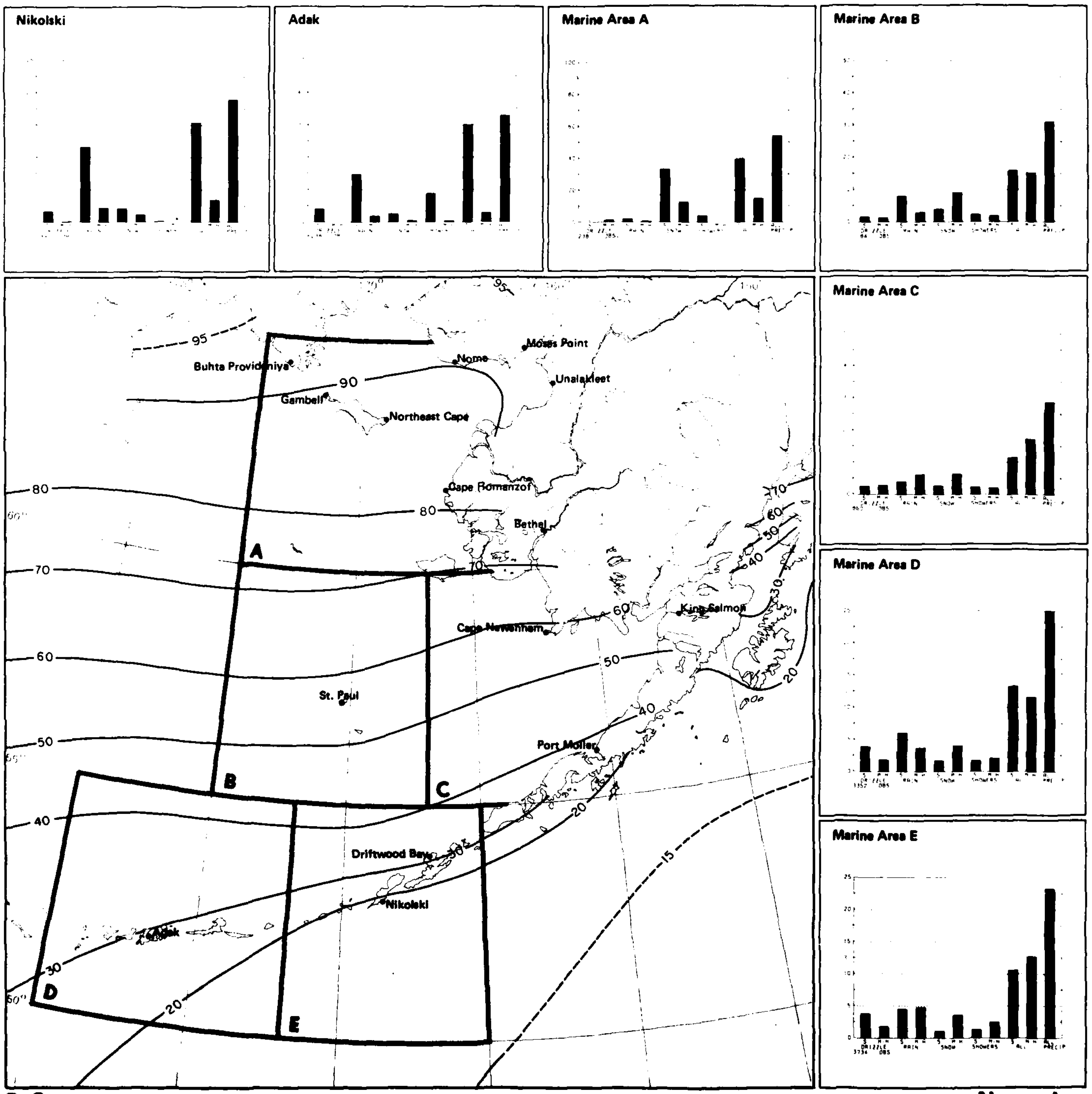


Port Moller



Driftwood Bay



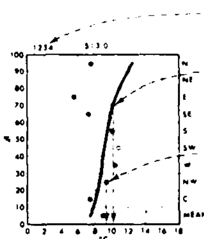


2 Snow

November

Legend

Air temperature/wind direction



Number of observations

Cumulative percent frequency of temperatures equal to or less than the temperature intersected by the curve

70% of all temperatures were ≤10.3 °C or ≤50.5 °F

S Standard deviation of temperatures °C

Mean temperature for each wind direction, calm and for all data combined are represented by dots

(With NW winds, the mean temperature was 9.4 °C or 48.9 °F)

. Indicates that the mean temperature for a direction or calm was computed from 10-30 observations

The mean temperature is omitted when less than 10 observations for a direction or calm were available

Map - Air temperature mean and thresholds

BLACK LINE Percent frequency of temperature ≤0°C ≤32°F

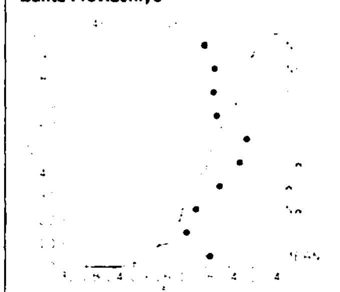
RED LINE Mean air temperature °C

BLUE LINE Percent frequency of wind chill temperature ≤ 30°C ≤ 22°F

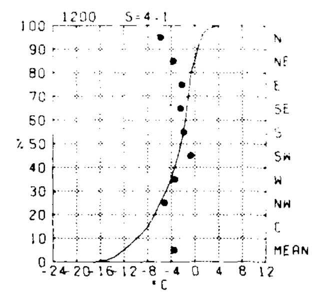
Air temperature readings recorded on transient ships in warm, sunny weather appear biased toward high temperatures, apparently because of improper instrument exposure and ventilation. Despite the inaccuracies, the large scale patterns and mean gradients of the isopleth analyses are relatively accurate.

The temperature scale of the graph may vary in both range and class interval. The percentage of temperature observations greater than a given value can be obtained by subtracting the cumulative percent frequency of that value from 100%. The number of observations and the standard deviation plus the plotted points on the graphs are based on those observations reporting both temperature and wind direction. The cumulative curve is based on all observations reporting temperature with or without wind direction.

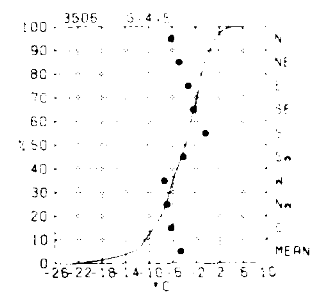
Buhta Provideniya



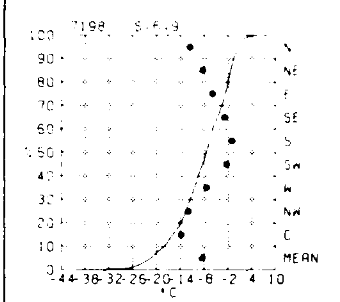
Gambell



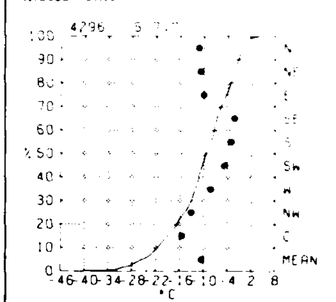
Northeast Cape



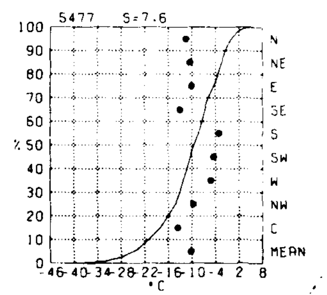
Nome



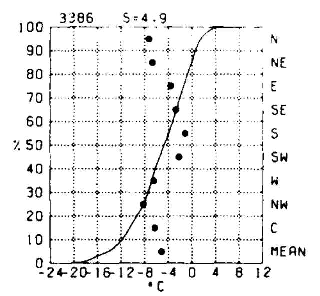
Moses Point



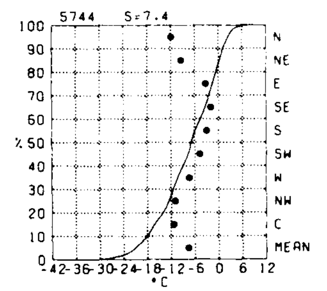
Unalakleet



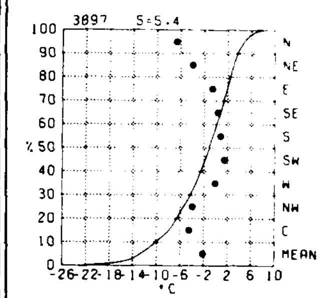
Cape Romanzof



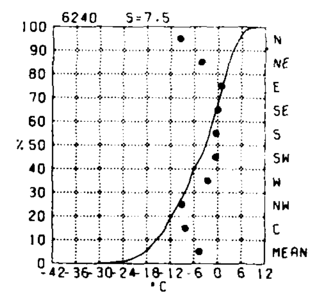
Bethel



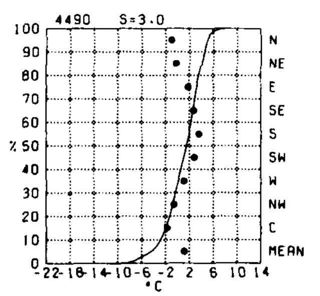
Cape Newenham



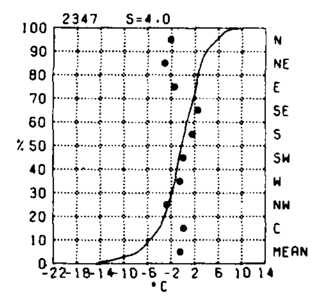
King Salmon



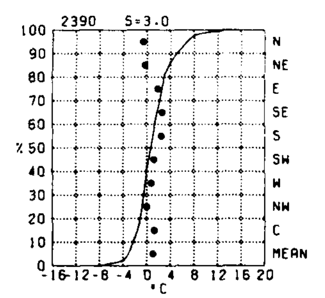
St. Paul

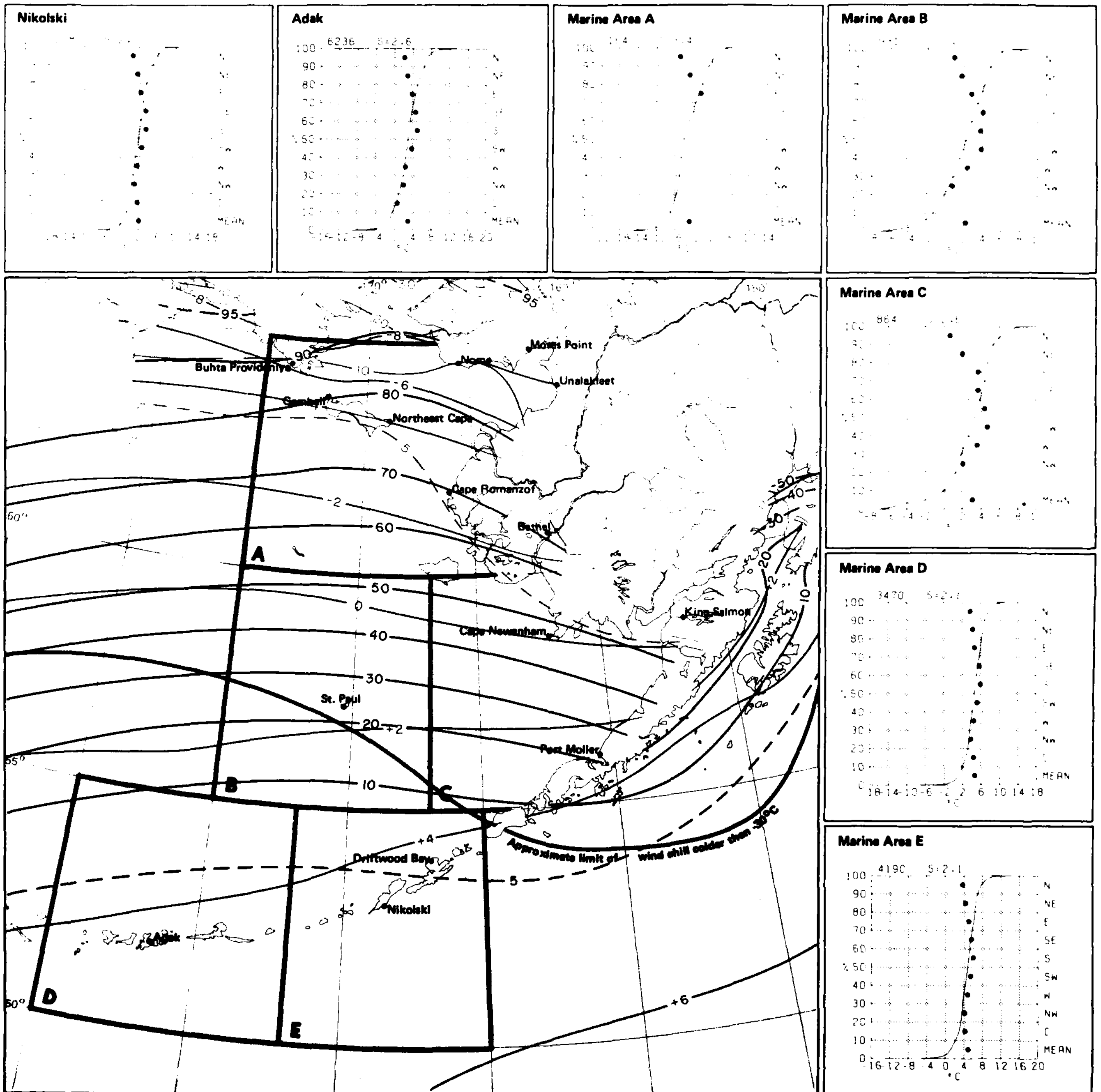


Port Moller



Driftwood Bay



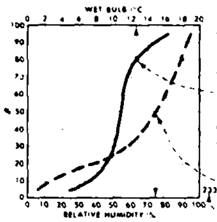


3 Air temperature mean and thresholds

November

Legend

Wet bulb/relative humidity



Cumulative percent frequency of wet bulb temperatures equal to or less than the temperature intersected by the curve (top scale)

Wet bulb °C

(80% of all observed wet bulb temperatures were ≤12.5°C or 54.5°F)

Cumulative percent frequency of relative humidities equal to or less than the humidity intersected by the curve (bottom scale)

Relative humidity %

(50% of all observed relative humidities were ≤74%)

Number of observations

Map - Mean dew point temperature

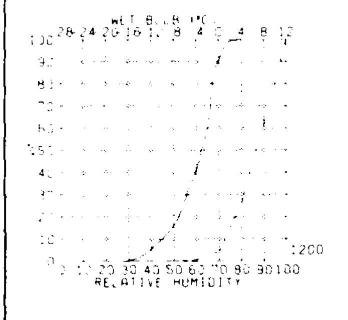
BLACK LINE Mean dew point temperature (°C)

The observation count of the graph reflects those observations reporting both air and wet bulb temperatures; both are required in computing the relative humidity. The percentage of observations of either element greater than a given value can be obtained by subtracting the cumulative percent frequency of that value from 100%.

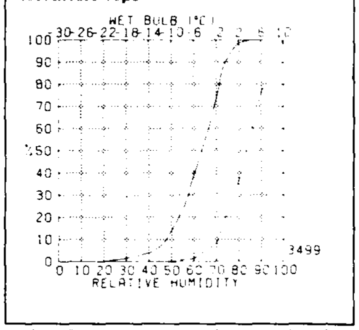
Buhta Provideniya

Insufficient Data

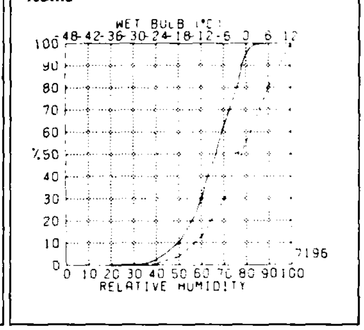
Gambell



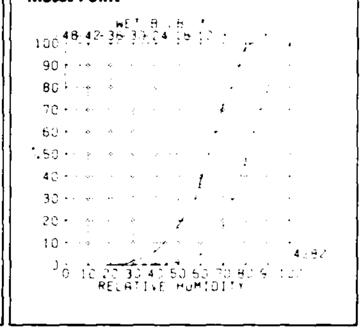
Northeast Cape



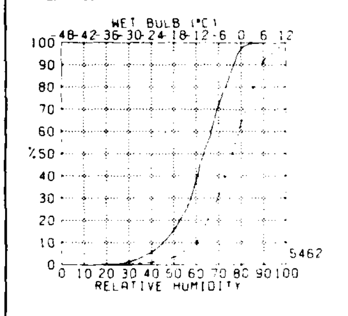
Nome



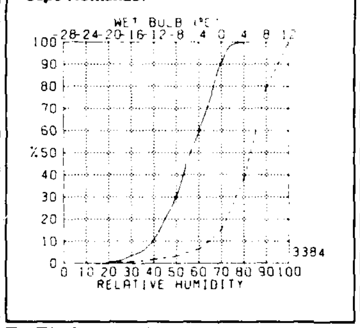
Moses Point



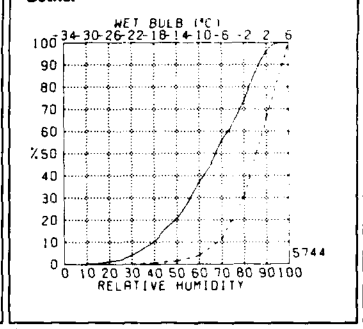
Unalakleet



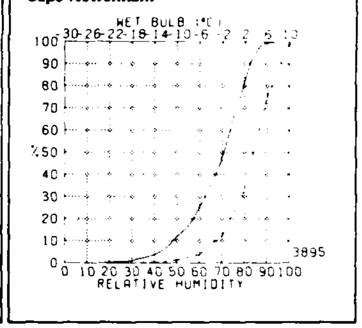
Cape Romanzof



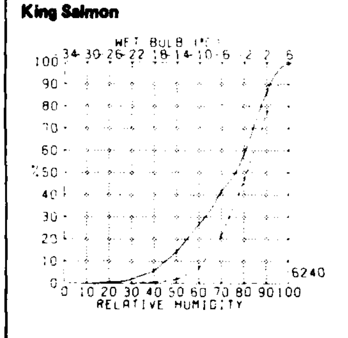
Bethel



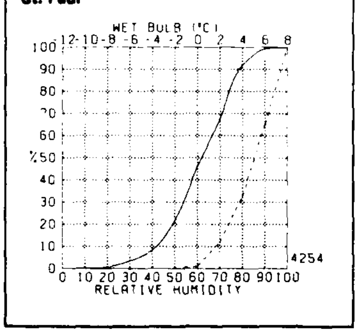
Cape Newenham



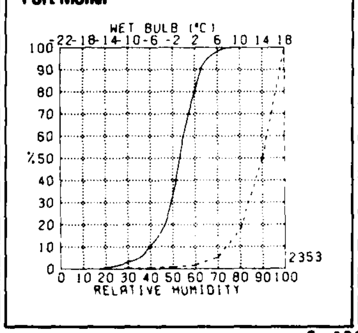
King Salmon



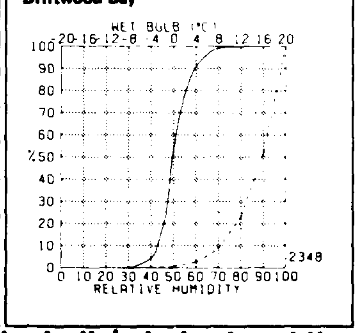
St. Paul

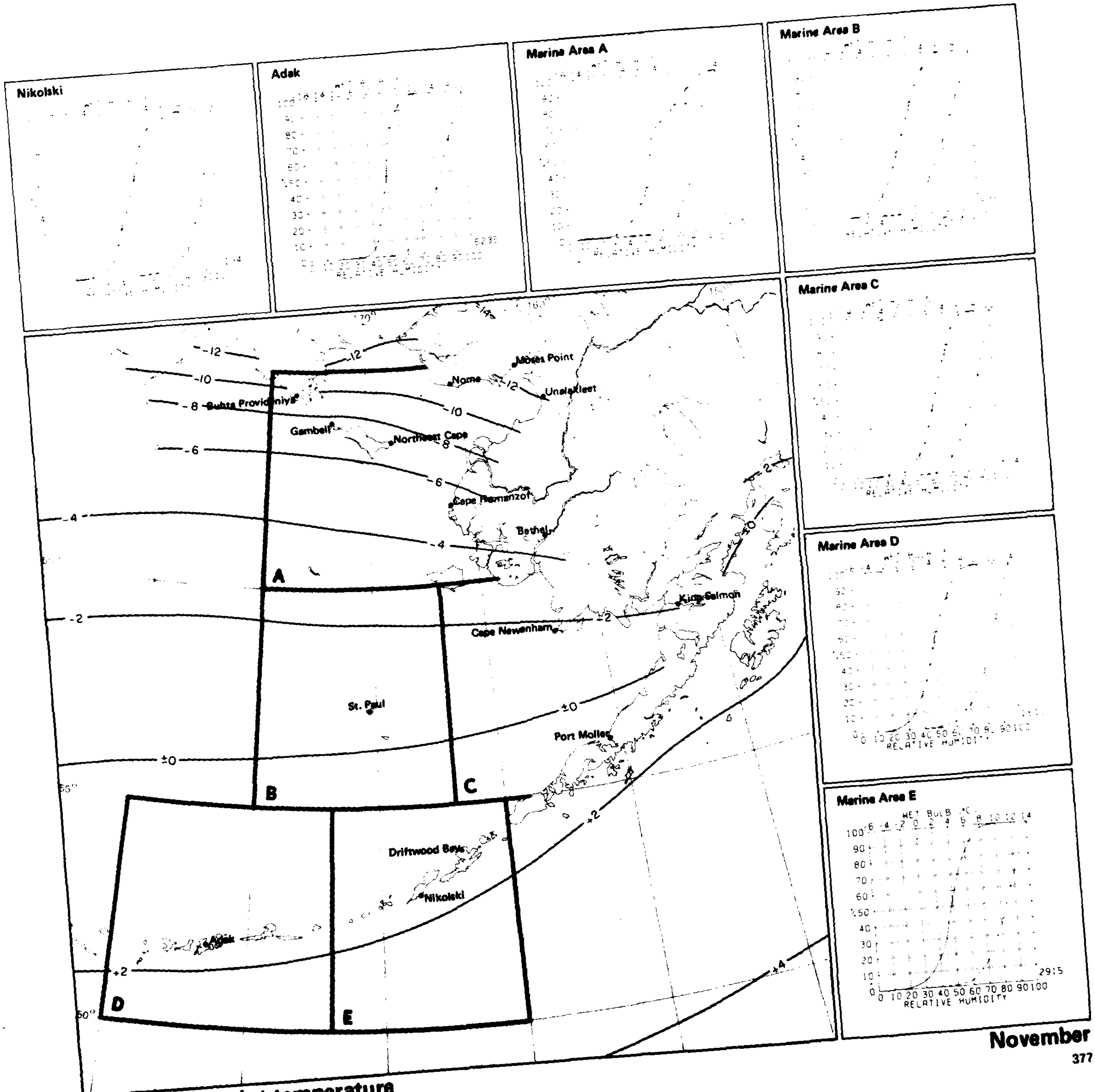


Port Moller



Driftwood Bay





November

4 Mean dew point temperature

Legend

Air temperature/wind speed

WIND SPEED (kts)

Temp °C	0-3	4-10	11-21	22-33	≥34
[illegible]	18	8	7	1	1
[illegible]	17	8	7	1	1
[illegible]	13	8	5	1	1
[illegible]	1	+	0	0	0
[illegible]	0	0	0	0	0
[illegible]	+	0	0	+	+
[illegible]	1	+	0	0	0
[illegible]	0	0	0	0	0
[illegible]	1	+	0	0	0
[illegible]	1	0	0	0	0
[illegible]	1	+	0	0	0
					3550

Percent frequency of simultaneous occurrence of specified temperature (°C) and wind speed (knots)

(1% of all observations reported temperature 2-3°C simultaneously with wind speed of 22-33 kts.)

Indicates < 5% but >0

Number of observations

Map - Air temperature extremes (°C)

BLACK LINE Maximum (99%) air temperature (1% of temperatures were greater than the given value)

BLUE LINE Minimum (1%) air temperature (1% of temperatures were equal to or less than the given value)

The graph can be used to determine the extent of human discomfort from the combined effects of extreme heat or cold and winds or to estimate the likelihood of superstructure icing. Icing potential increases as the air temperature drops below freezing and the winds increase above 10 knots (12 mph) and may become quite severe with temperatures equal to or less than -9°C (16°F) and winds equal to or greater than 34 knots (39 mph)

Buhta Provideniya

Gambell

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥34
2,3	0	+	2	2	+
0,1	+	3	10	6	1
-2,-1	1	5	9	10	2
-4,-3	+	4	6	7	1
-6,-5	+	2	4	3	1
-8,-7	+	1	4	4	1
-10,-9	+	+	2	1	+
-12,-11	0	1	1	2	1
-14,-13	0	1	2	1	0
-16,-15	0	1	+	+	0
-18,-17	0	0	0	0	0
					1200

Northeast Cape

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥34
6,7	0	0	0	0	+
4,5	0	0	+	+	+
2,3	+	1	2	2	+
0,1	+	2	6	3	+
-2,-1	1	4	10	3	+
-4,-3	1	3	11	5	+
-6,-5	1	2	6	2	+
-8,-7	1	3	8	3	+
-10,-9	+	1	3	1	+
-12,-11	1	2	3	+	+
≤-13	1	2	2	+	+
					3506

Nome

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥34
6,7	0	0	+	+	+
4,5	0	+	+	+	0
2,3	+	1	1	1	+
0,1	+	2	4	1	+
-2,-1	1	4	6	1	+
-4,-3	1	4	6	1	+
-6,-5	1	3	4	1	+
-8,-7	1	5	5	1	+
-10,-9	1	4	3	1	0
-12,-11	2	5	3	1	+
≤-13	8	14	3	+	0
					7198

Moses Point

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥34
4,5	0	0	+	[illegible]	[illegible]
2,3	0	+	+	+	+
0,1	+	1	3	1	+
-2,-1	1	4	4	1	+
-4,-3	1	4	4	+	+
-6,-5	1	3	4	+	0
-8,-7	1	5	5	1	0
-10,-9	1	3	4	1	0
-12,-11	1	4	4	1	+
-14,-13	2	3	3	+	0
≤-15	7	12	5	1	0
					4295

Unalakleet

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥34
6,7	0	+	+	+	+
4,5	0	+	+	+	+
2,3	+	1	1	+	+
0,1	+	1	2	1	0
-2,-1	+	2	4	2	+
-4,-3	1	2	5	2	+
-6,-5	1	2	4	2	+
-8,-7	1	3	5	3	+
-10,-9	1	3	3	2	+
-12,-11	1	4	5	2	+
≤-13	5	16	8	3	+
					5474

Cape Romanzof

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥34
6,7	+	+	0	+	0
4,5	+	+	+	0	0
2,3	+	1	3	1	+
0,1	1	3	7	2	+
-2,-1	2	4	8	2	+
-4,-3	3	4	7	2	+
-6,-5	2	3	4	2	+
-8,-7	3	4	5	3	1
-10,-9	1	2	3	2	+
-12,-11	1	2	3	1	+
≤-13	1	2	3	1	+
					3386

Bethel

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥34
8,9	0	0	+	0	0
6,7	0	+	+	+	+
4,5	+	+	1	+	+
2,3	+	3	4	1	+
0,1	+	4	5	1	0
-2,-1	1	5	4	+	+
-4,-3	1	5	3	+	0
-6,-5	1	4	2	+	0
-8,-7	1	6	4	+	0
-10,-9	1	4	3	+	0
≤-11	3	16	13	1	0
					5744

Cape Newenham

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥34
8,9	0	0	+	0	0
6,7	+	1	2	1	+
4,5	+	3	5	1	+
2,3	2	8	8	1	0
0,1	2	6	6	1	+
-2,-1	3	5	4	1	+
-4,-3	2	4	4	2	+
-6,-5	2	2	2	1	+
-8,-7	1	2	2	1	+
-10,-9	1	1	2	+	+
≤-11	2	3	2	1	0
					3897

King Salmon

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥34
10,11	0	0	+	+	0
8,9	0	+	+	+	0
6,7	+	1	2	1	+
4,5	+	1	3	1	+
2,3	1	5	6	1	+
0,1	1	7	3	+	+
-2,-1	2	6	3	+	0
-4,-3	2	5	2	+	0
-6,-5	1	4	1	0	0
-8,-7	2	4	2	+	0
≤-9	7	14	8	1	0
					6240

St. Paul

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥34
6,7	0	+	1	2	+
4,5	+	2	10	6	1
2,3	+	4	15	8	1
0,1	+	5	9	5	1
-2,-1	1	4	8	3	1
-4,-3	1	2	3	2	+
-6,-5	+	1	1	1	+
-8,-7	+	1	1	+	0
-10,-9	0	+	+	0	0
-12,-11	+	0	0	0	0
-14,-13	0	0	0	0	0
					4490

Port Moller

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥34
10,11	+	0	0	0	0
8,9	+	+	+	0	0
6,7	1	1	2	1	0
4,5	1	3	3	1	+
2,3	5	8	7	1	+
0,1	4	9	7	1	+
-2,-1	3	9	7	1	+
-4,-3	2	5	5	1	0
-6,-5	1	2	2	+	0
-8,-7	+	1	1	+	0
≤-9	+	2	2	+	0
					2347

Driftwood Bay

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥34
14,15	0	+	+	0	0
12,13	0	+	+	+	+
10,11	+	+	+	+	+
8,9	+	1	1	+	0
6,7	1	3	1	+	+
4,5	1	3	2	+	0
2,3	6	13	6	+	+
0,1	4	16	7	+	0
-2,-1	4	12	5	+	+
-4,-3	1	4	2	+	0
≤-5	+	1	1	+	0
					2390

Nikolski

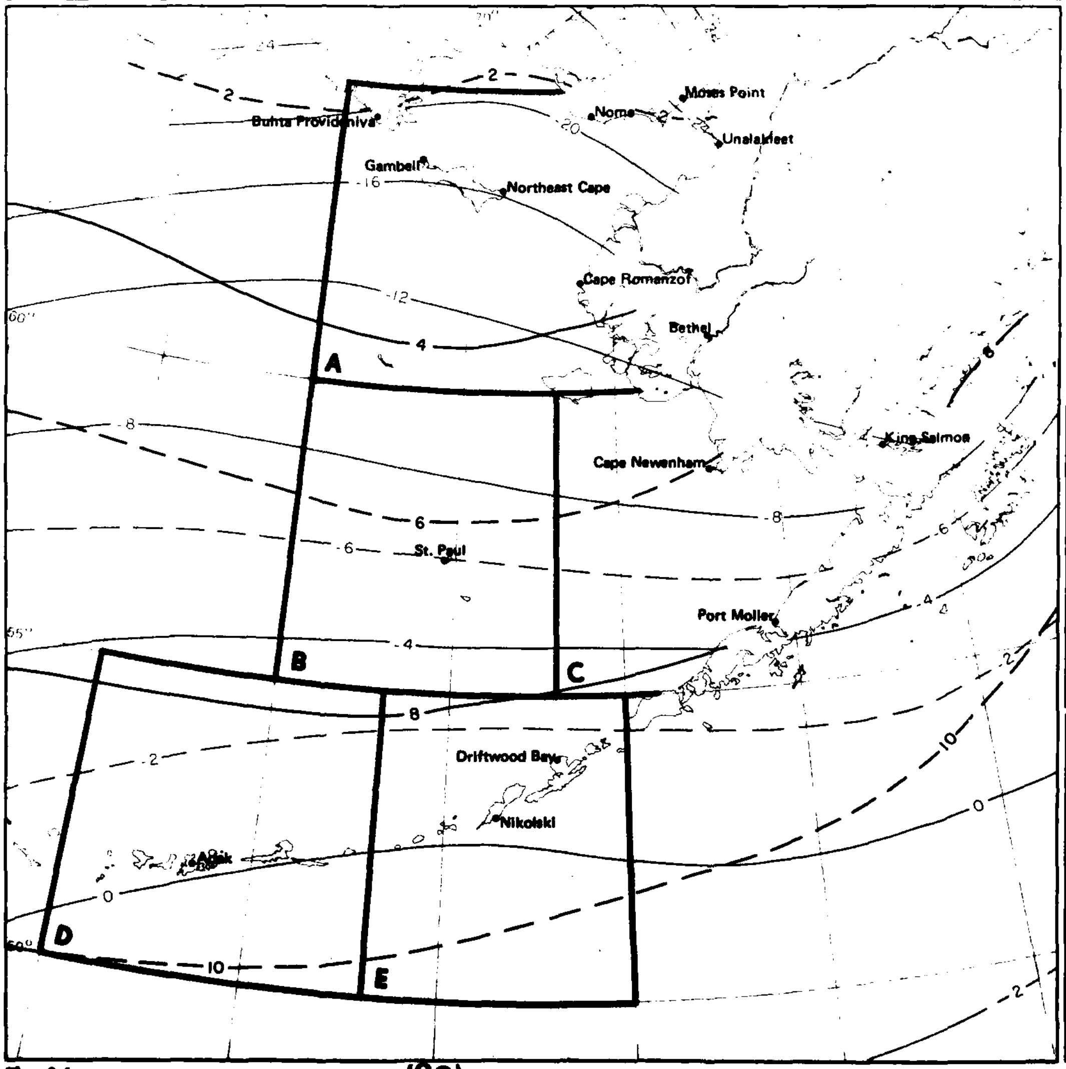
2080

Adak

6236

Marine Area A

Marine Area B



Marine Area C

Marine Area D

Marine Area E

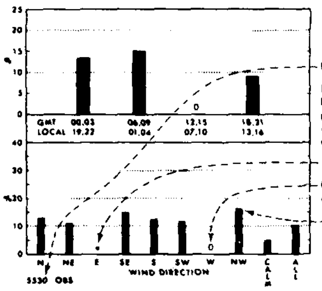
4190

5 Air temperature extremes (°C)

November

Legend

Fog/time and fog/wind direction



Number of observations

Bar graphs represent percent frequency of Fog (without precipitation) for various hour groupings and wind directions. Data are based on 100% for each hour-group and direction category

* indicates < 05% but >0

0 indicates no fog occurred with the wind direction

(Data show that 17% of all NW winds were accompanied by Fog (without precipitation))

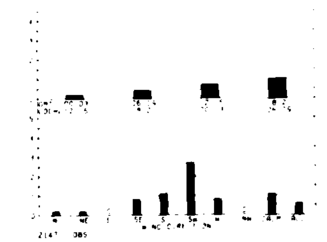
Map - Fog

BLACK LINE · Percent frequency of occurrence of all fog

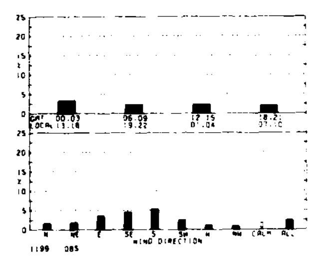
BLUE LINE · Percent frequency of fog occurring without precipitation

The percent frequency of observations reporting fog with precipitation for a given point can be determined by computing the difference between the two analyses

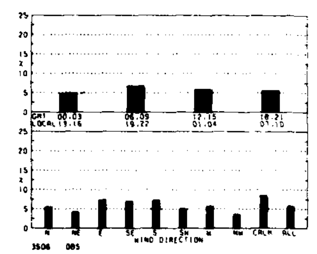
Buhta Provideniya



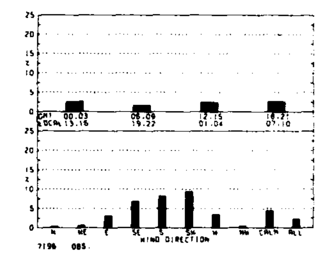
Gambell



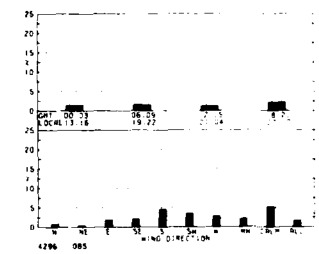
Northeast Cape



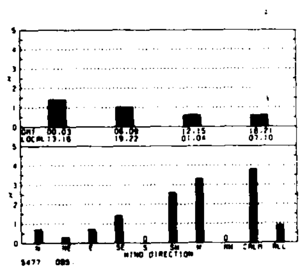
Nome



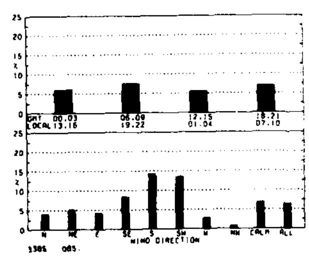
Moses Point



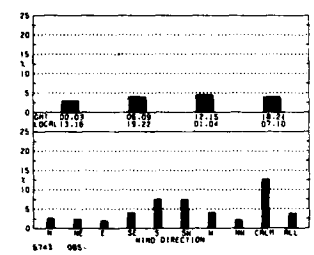
Unalakleet



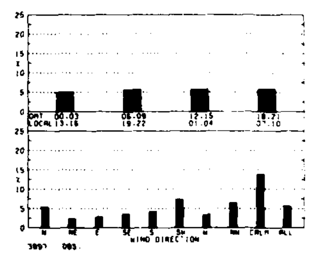
Cape Romanzof



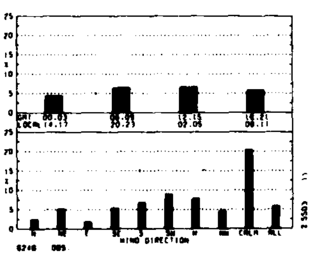
Bethel



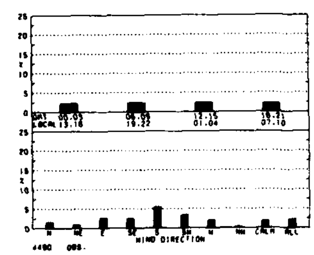
Cape Newenham



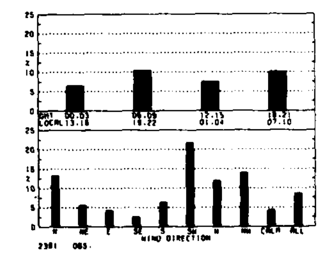
King Salmon



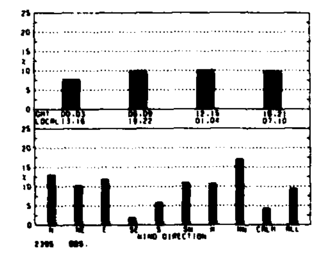
St. Paul

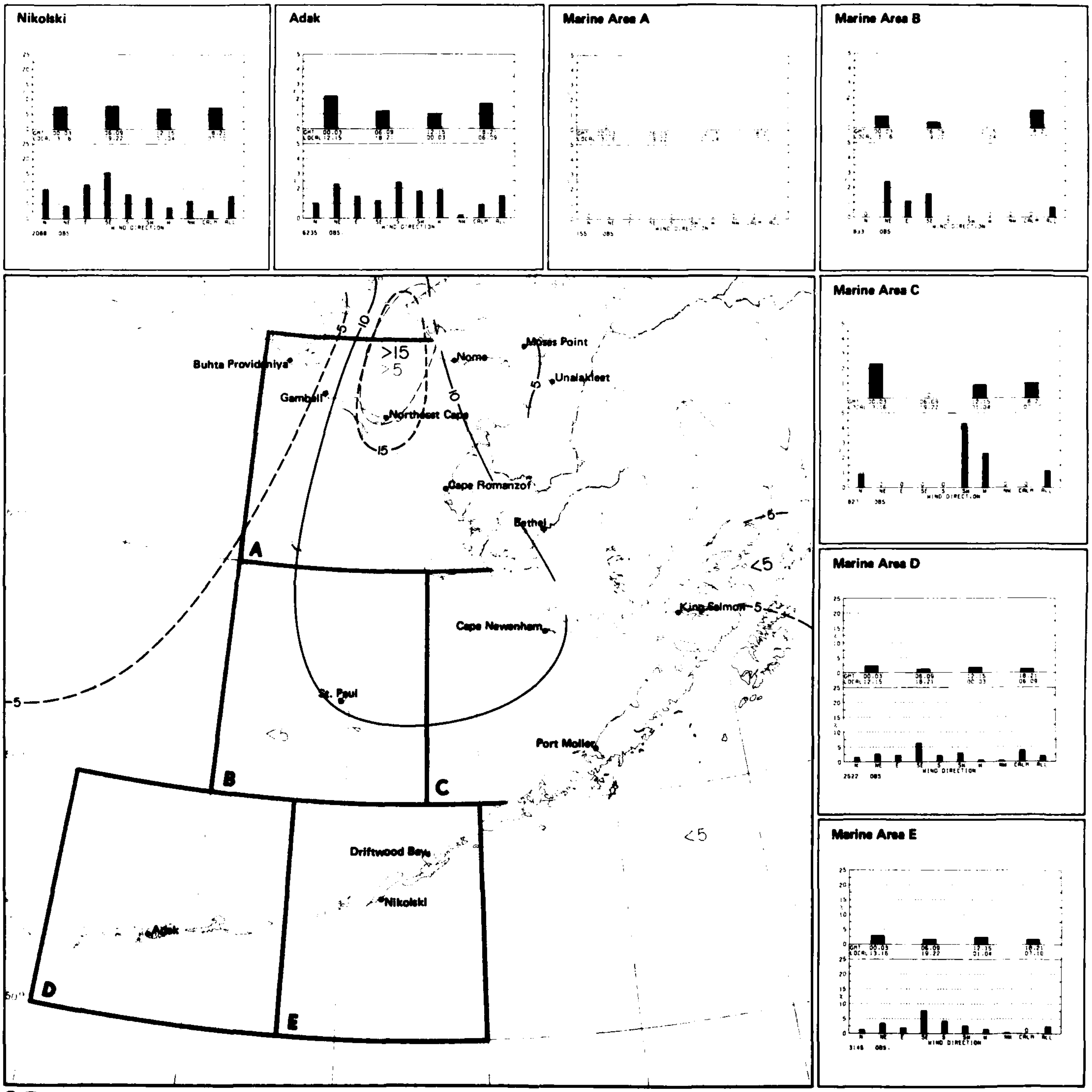


Port Moller



Driftwood Bay



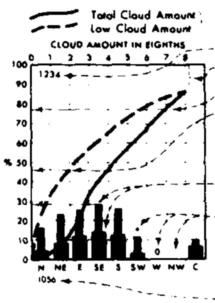


6 Fog

November

Legend

Cloud cover/wind direction



Total Cloud Amount / Low Cloud Amount: Cumulative percent frequency of indicated cloud amount equal to or less than the amount intersected by the curve

Number of total cloud observations

Obscurations

(77% of all total cloud amounts were ≤7/8)

(46% of all low cloud amounts were ≤2/8)

Low cloud amount: Percent frequency of observations from each direction and calm that were accompanied by low cloud amounts ≥5/8 and ≥7/8. Low clouds are clouds with bases <8000 feet

(28% of all SE winds were accompanied by low cloud amounts ≥5/8 and 14% by low cloud amounts ≥7/8)

An asterisk indicates that the percentage is based on 10-30 observations of wind direction, total and low cloud amount. 0 replaces bar graph when no low cloud amounts ≥5/8 were observed with a wind direction or calm. 0 or bar is omitted when number of observations of total and low cloud amount from a wind direction or calm is less than 10

Number of low cloud observations

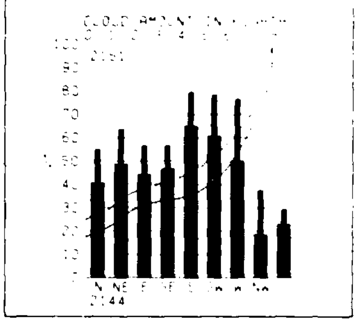
Map - Cloud amount thresholds

BLACK LINE Percent frequency of total cloud amount ≤2/8

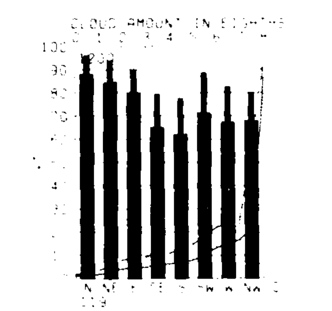
BLUE LINE Percent frequency of low cloud amount ≥5/8

Since the number of observations reporting low cloud amount is usually less than that for total cloud amount, somewhat different samples may be used to compute the two curves on the graph. This may lead to inconsistencies where low cloud amount appears higher than the total cloud amount. Where this occurred the graph was adjusted in favor of the total cloud by making the curves coincide. The frequency of obscured conditions may be determined by subtracting the cumulative percent frequency corresponding to 8/8 coverage from 100%. In computing the bar graph, obscurations are considered as 8/8 coverage

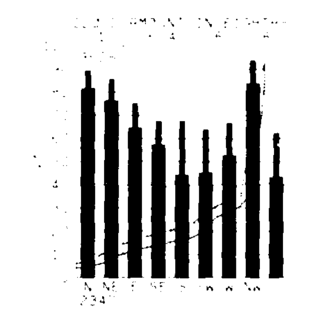
Buhta Provideniya



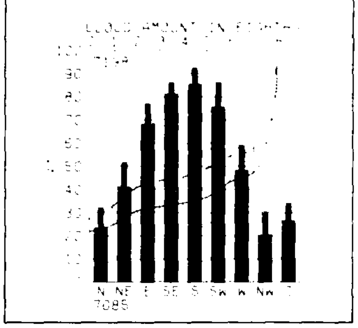
Gambell



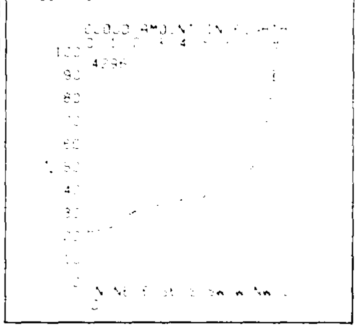
Northeast Cape



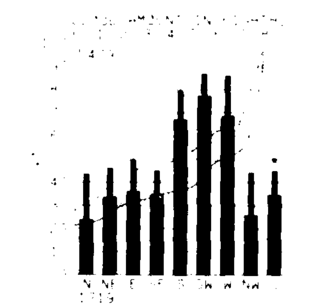
Nome



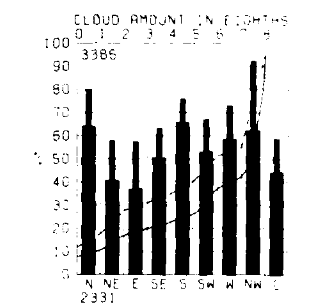
Moses Point



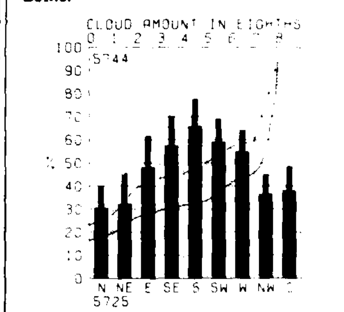
Unalakleet



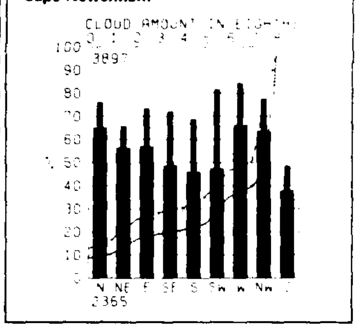
Cape Romanzof



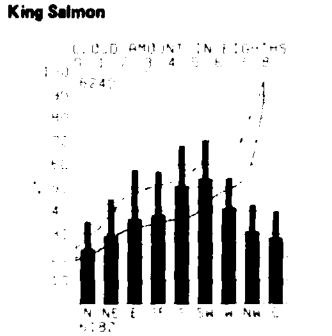
Bethel



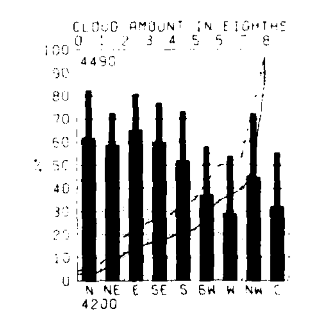
Cape Newenham



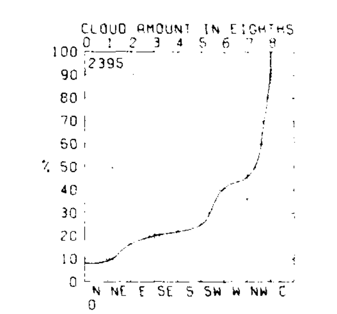
King Salmon



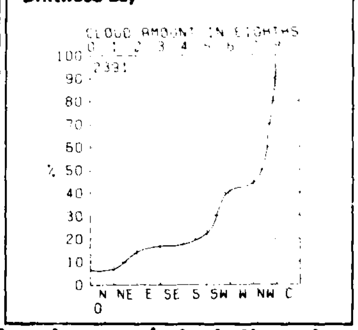
St. Paul

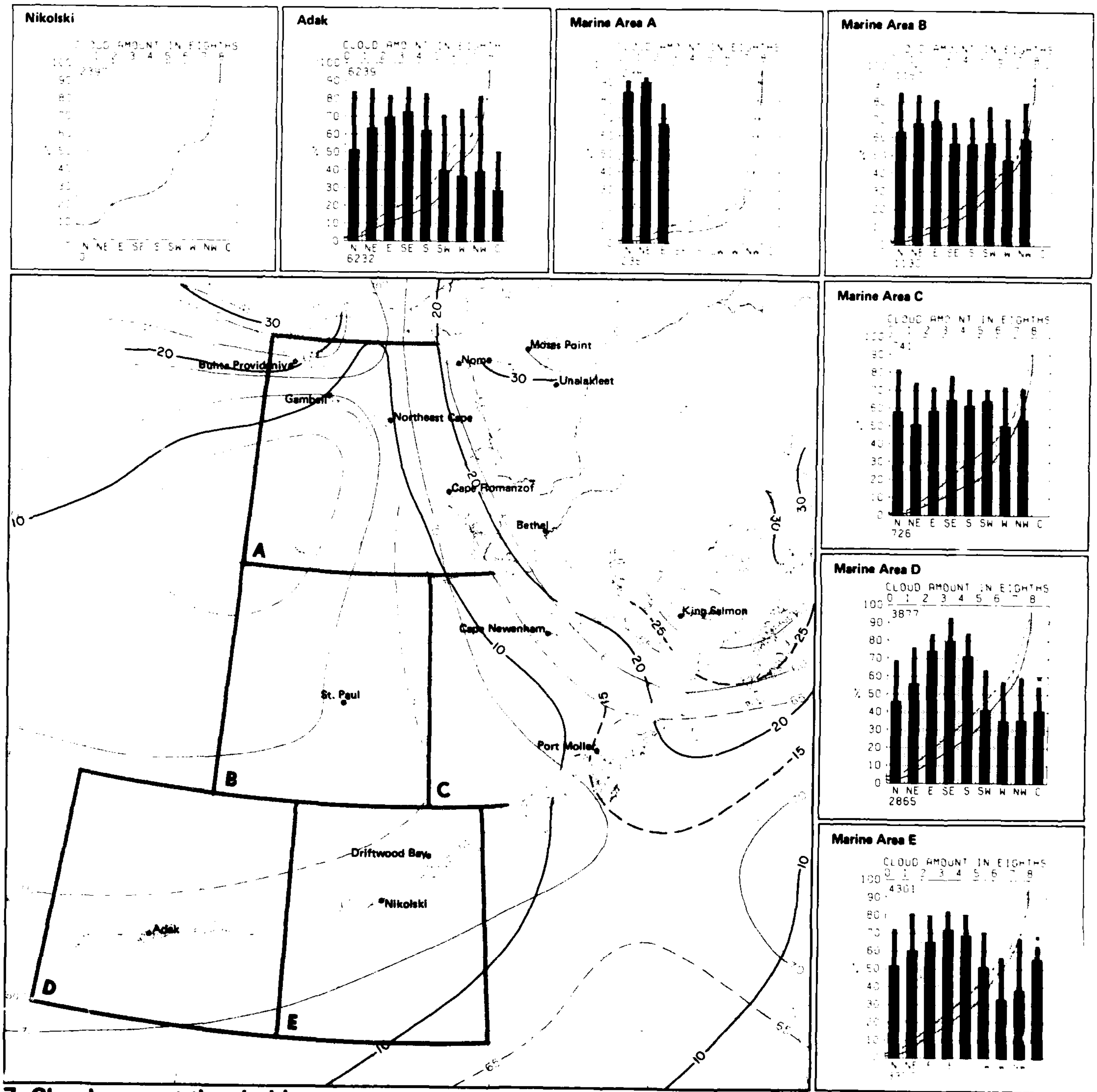


Port Moller



Driftwood Bay





7 Cloud amount thresholds

November

AD-A081 311 ALASKA UNIV ANCHORAGE ARCTIC ENVIRONMENTAL INFORMATI--ETC F/G 4/2
CLIMATIC ATLAS OF THE OUTER CONTINENTAL SHELF WATERS AND COASTA--ETC(U)
1977 W A BROWER, H F DIAZ, A S PRECHTEL
UNCLASSIFIED AEIDC-B-77-VOL-2 NL

5 - 5

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DATE
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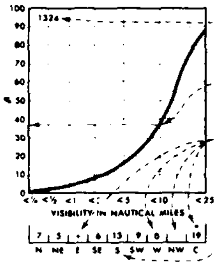
Legend

Visibility/wind direction



Number of observations

Cumulative percent frequency of visibilities less than the visibility intersected by the curve

(37% of all visibilities reported were <10 nautical miles.)

The table below the graph indicates percent frequency of occurrence of visibility <2 nautical miles versus wind direction

+ indicates < 5% but >0   0 indicates that no visibilities <2 nautical miles were observed with winds from a direction or calm. No percentage is given if less than 10 observations were available for visibility and wind direction. An asterisk indicates that the percentage was based on 10-30 observations of visibility and wind direction

(13% of all S winds were accompanied by visibilities <2 nautical miles.)

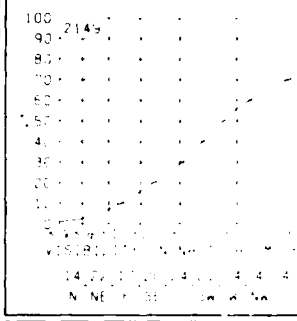
Map - Visibility thresholds

BLACK LINE   Percent frequency of visibilities ≥5 nautical miles

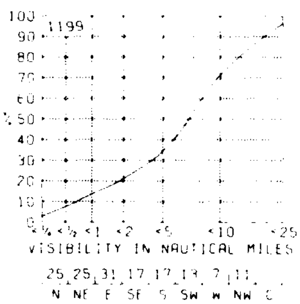
BLUE LINE   Percent frequency of visibilities <2 nautical miles

The percentage of visibility equal to or greater than a given value can be obtained from the graph by subtracting the cumulative percent frequency of that value from 100%. Visibility at sea is difficult to measure because of the lack of reference points. Also, some observers seem to report reduced visibilities at night because of darkness, though this tendency has abated in recent years. The coarseness of the coding intervals, however, tends to minimize serious biases in the summarized data. Visibilities greater than 25 nmi should be interpreted cautiously because the earth's curvature makes it impossible to see 25 nmi horizontally from the bridges of most ships

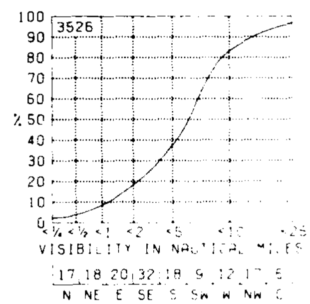
Buhta Providenіya



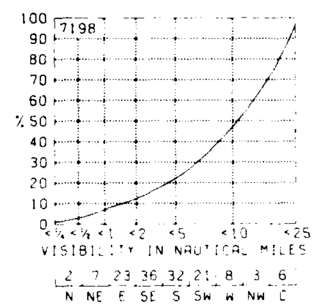
Gambell



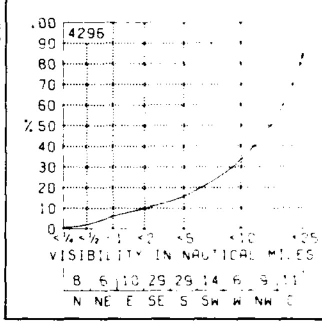
Northeast Cape



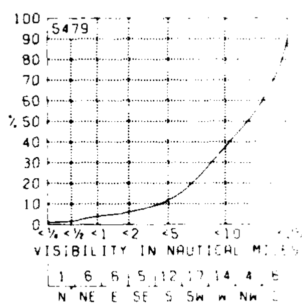
Nome



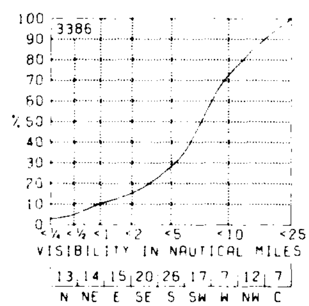
Moses Point



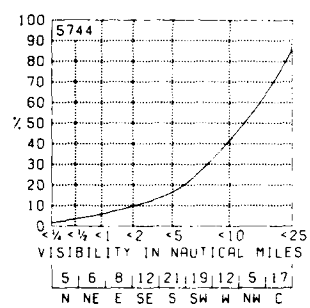
Unalakleet



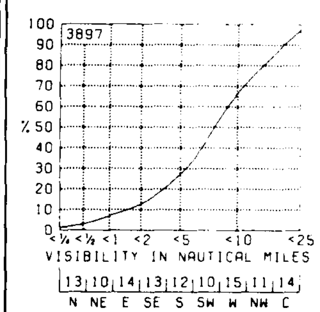
Cape Romanzof



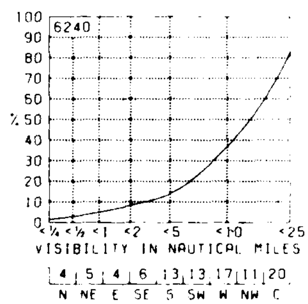
Bethel



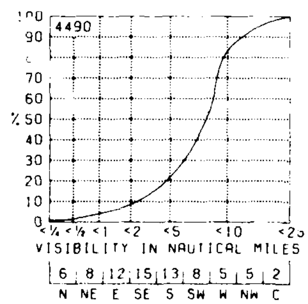
Cape Newenham



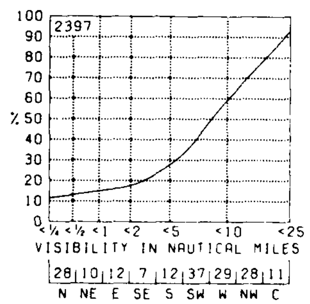
King Salmon



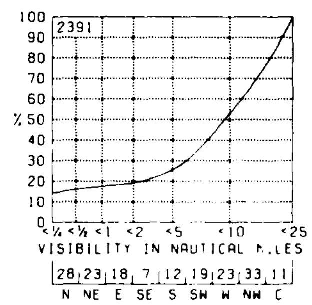
St. Paul

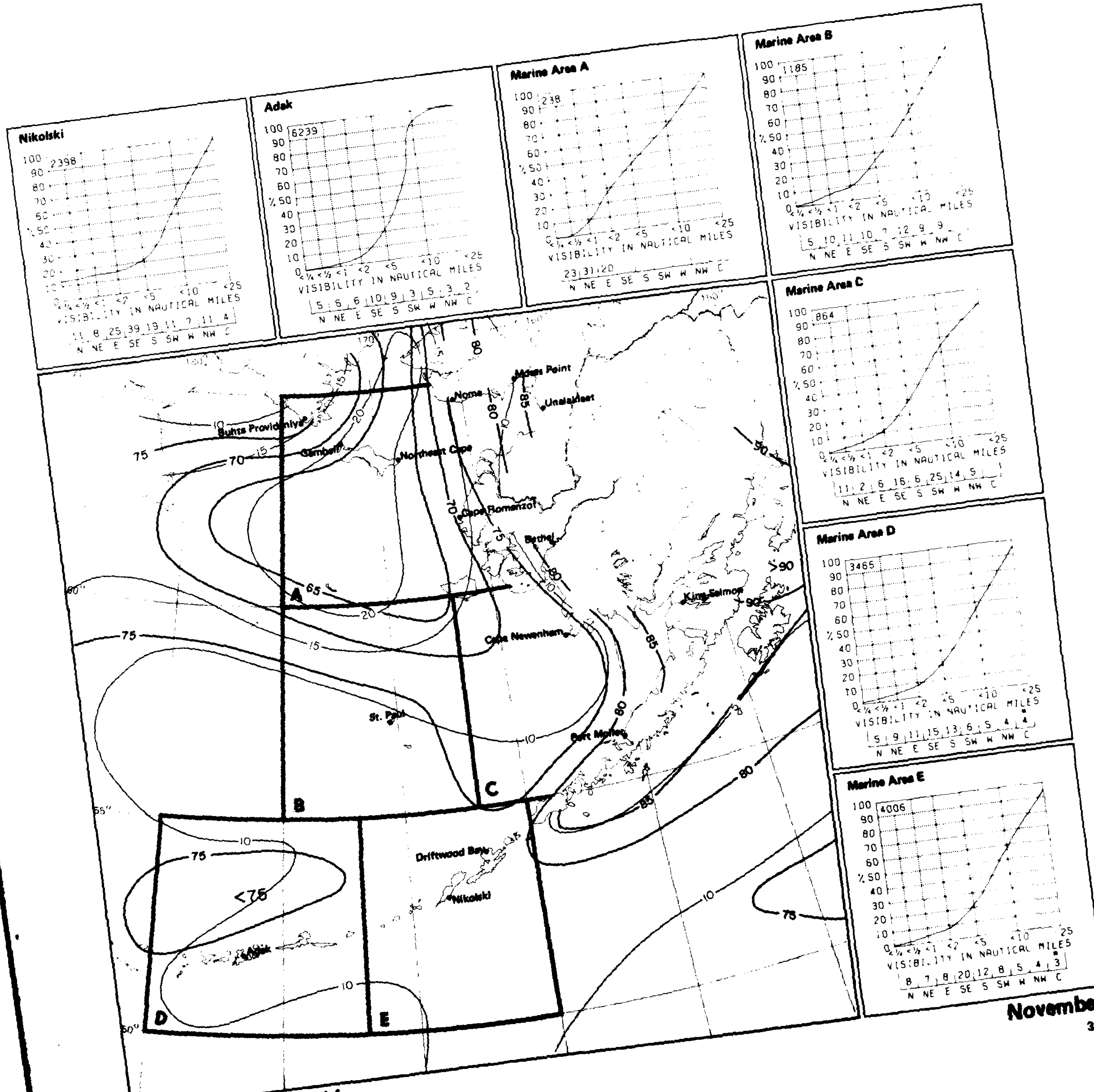


Port Moller



Driftwood Bay



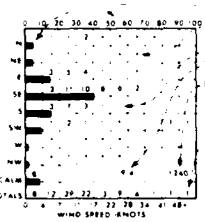


8 Visibility thresholds

Legend

Wind speed/direction

Direction frequency (top scale): Bars represent percent frequency of winds observed from each direction. Speed frequency (bottom scale): Printed figures represent percent frequency of wind speeds observed from each direction.



4% of all winds were from the N

• indicates < 5% but > 0

1% of all winds were from the S with a speed 22-27 knots

The scalar mean speed was 9.4 knots

Number of observations

1% of winds from all directions had wind speed ≥48 knots

WIND SPEED INTERVAL (KNOTS)

0-3	4-6	7-10	11-16	17-21	22-27	28-33	34-40	41-47	≥48
0	4	7	11	17	22	28	34	41	48+

Printed scale on bottom of chart

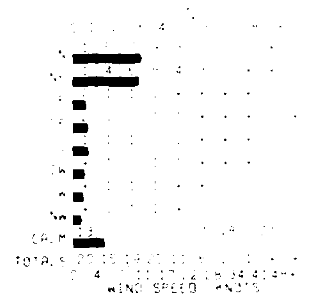
Map - Wind speed thresholds

BLACK LINE Percent frequency of wind speed ≤10 knots (≤12 mph)

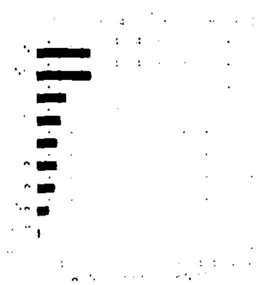
BLUE LINE Percent frequency of wind speed ≥34 knots (≥39 mph)

The scalar mean wind speed on the graph is based on the number of observations reporting a wind speed with direction. The sum of the totals line provides the cumulative percent frequency of wind speed below a selected threshold value. In the example graph, 71% of all winds were less than 17 knots (20 mph).

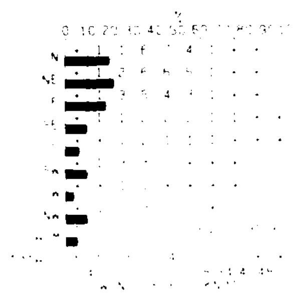
Buhta Provideniya



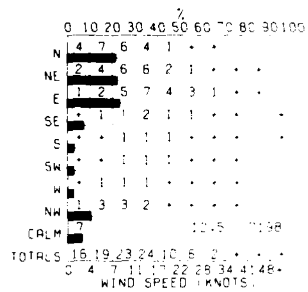
Gambell



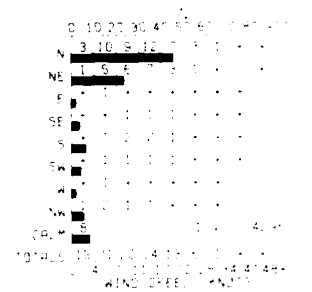
Northeast Cape



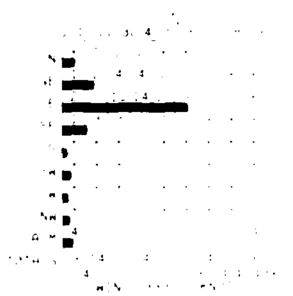
Nome



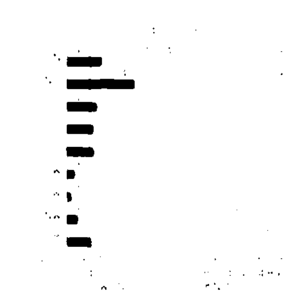
Moses Point



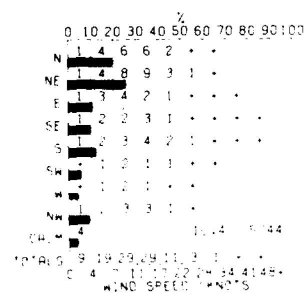
Unalakleet



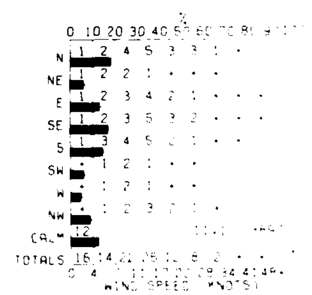
Cape Romanzof



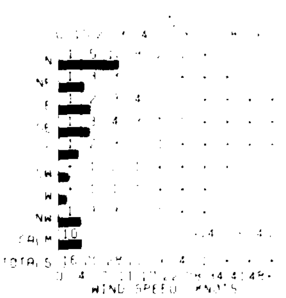
Bethel



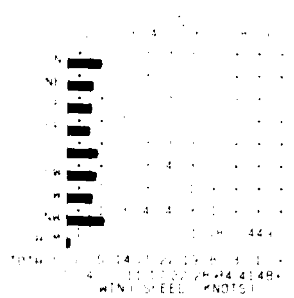
Cape Newenham



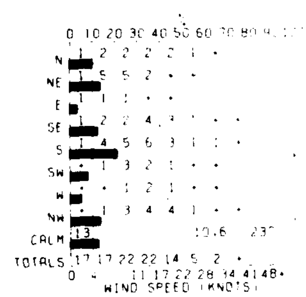
King Salmon



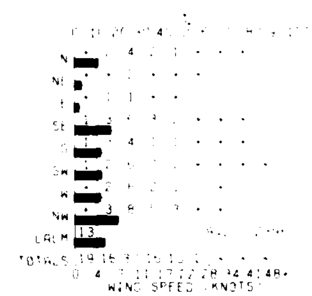
St. Paul

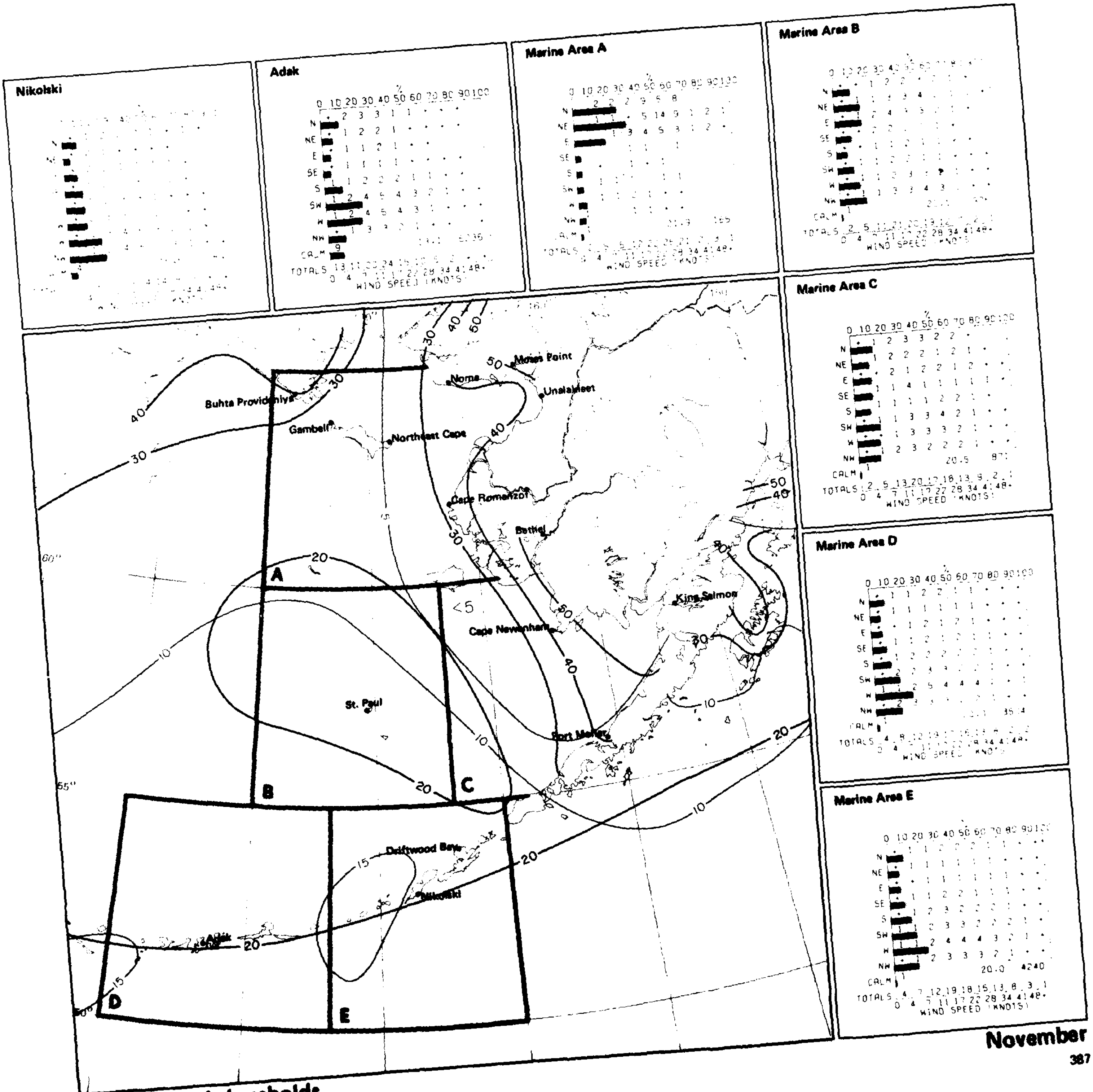


Port Moller



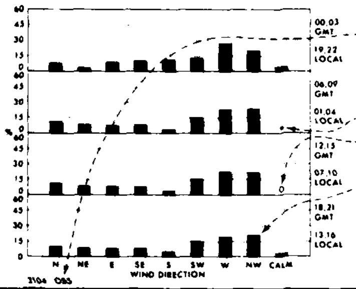
Driftwood Bay





9 Wind speed thresholds

Legend — Wind direction/diurnal variation

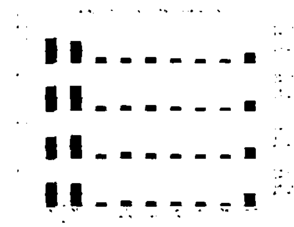


- Number of observations
- Bars show percent frequency of wind direction (8 pts) by hour (GMT and Local Time). Data are based on 100% for each hour group
- * indicates < 05% but > 0
- 0 indicates no observations in the category
- (22% of the wind observations for the hours 18 and 21 GMT (13 and 16 Local Time) had a direction from the northwest.)

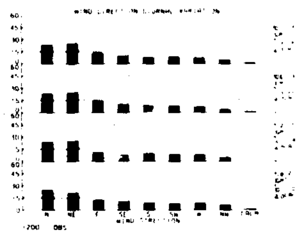
Map · Vector mean wind

10 2 Direction of flow toward station dot, vector magnitude in knots (example vector mean wind is from northeast at 10 2 knots or 11 7 mph)

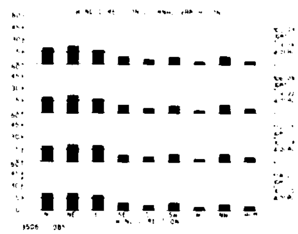
Buhta Provideniya



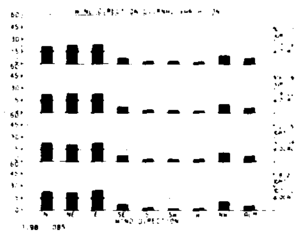
Gambell



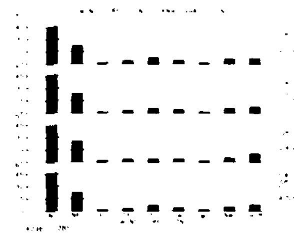
Northeast Cape



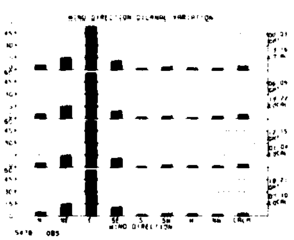
Nome



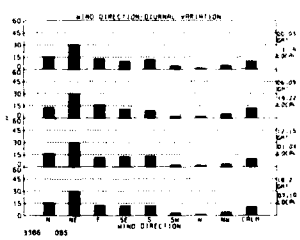
Moses Point



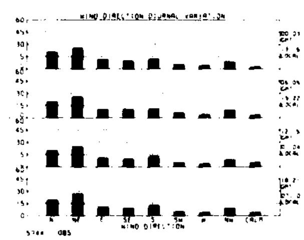
Unalakleet



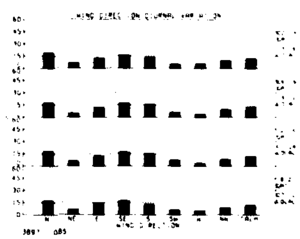
Cape Romanzof



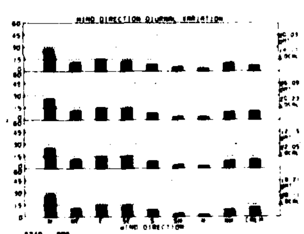
Bethel



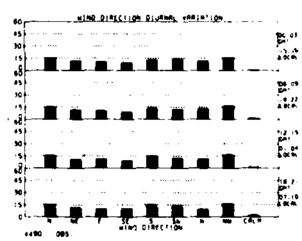
Cape Newenham



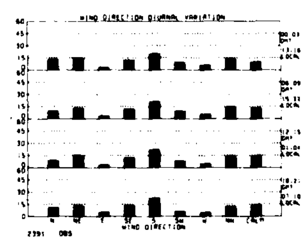
King Salmon



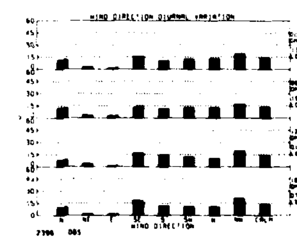
St. Paul

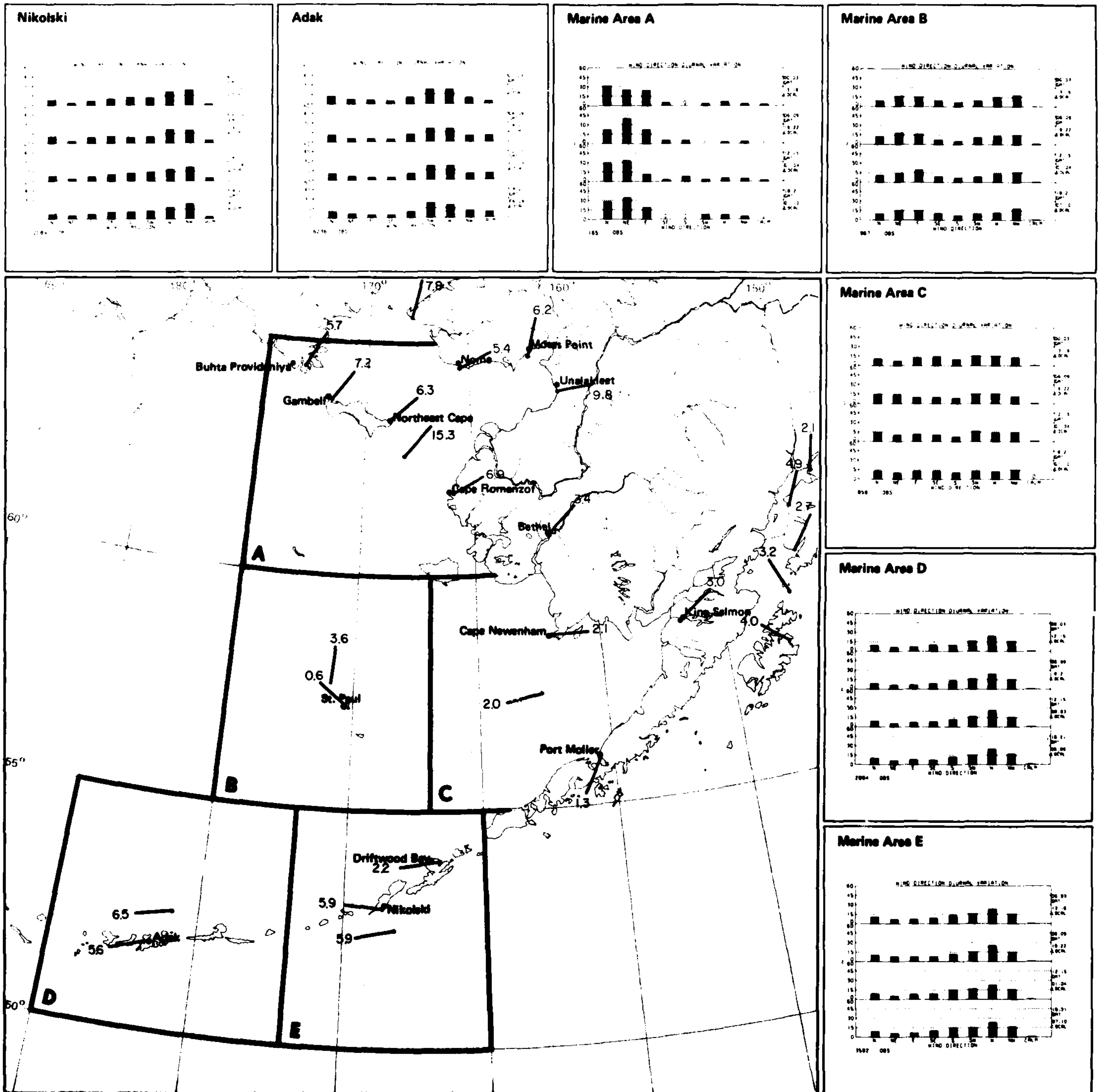


Port Moller



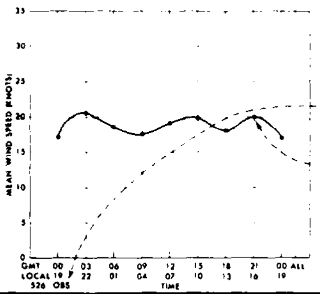
Driftwood Bay





10 Vector mean wind **November**

Legend **Wind speed/diurnal variation**

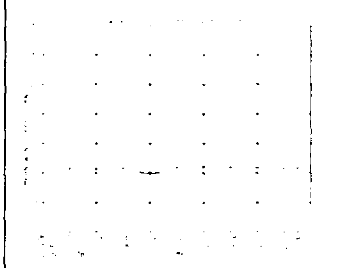


Map - Scalar mean wind

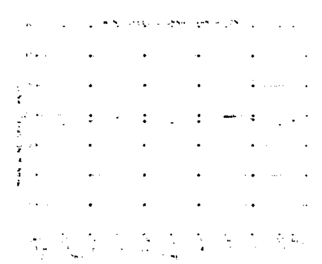
BLACK LINE Scalar mean wind (knots)

In areas of high persistence of direction, the magnitude of the vector mean winds should closely approach that of the scalar mean winds. As most of the marine observations are recorded at six hour intervals, disregard the plots for other than 00, 06, 12, 18, GMT hours on the marine area graphs.

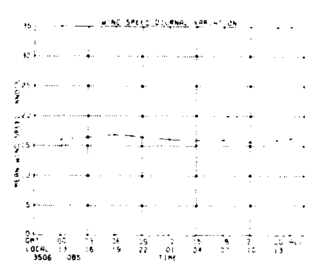
Buhta Provideniya



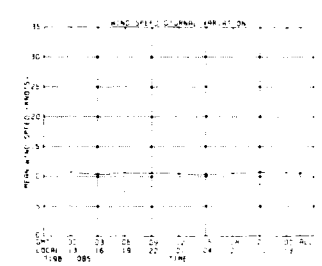
Gambell



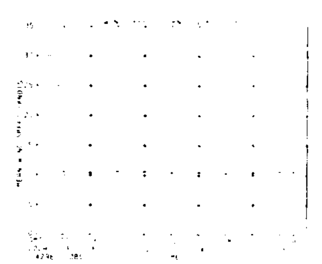
Northeast Cape



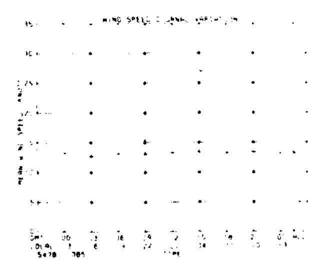
Nome



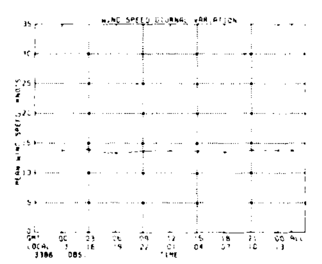
Moses Point



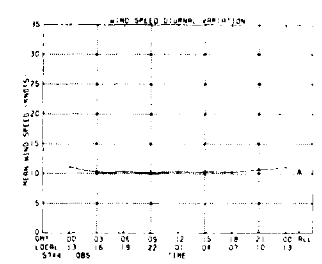
Unalakleet



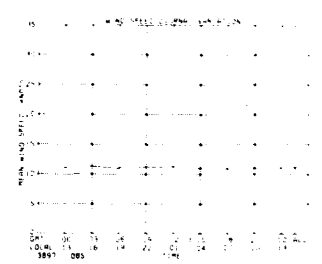
Cape Romanzof



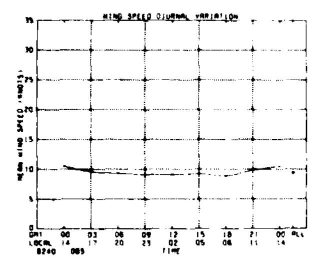
Bethel



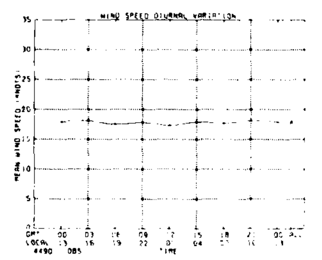
Cape Newenham



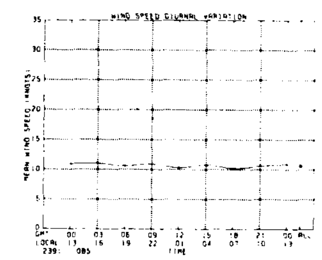
King Salmon



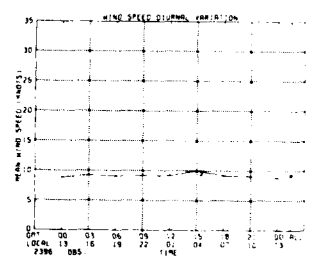
St. Paul

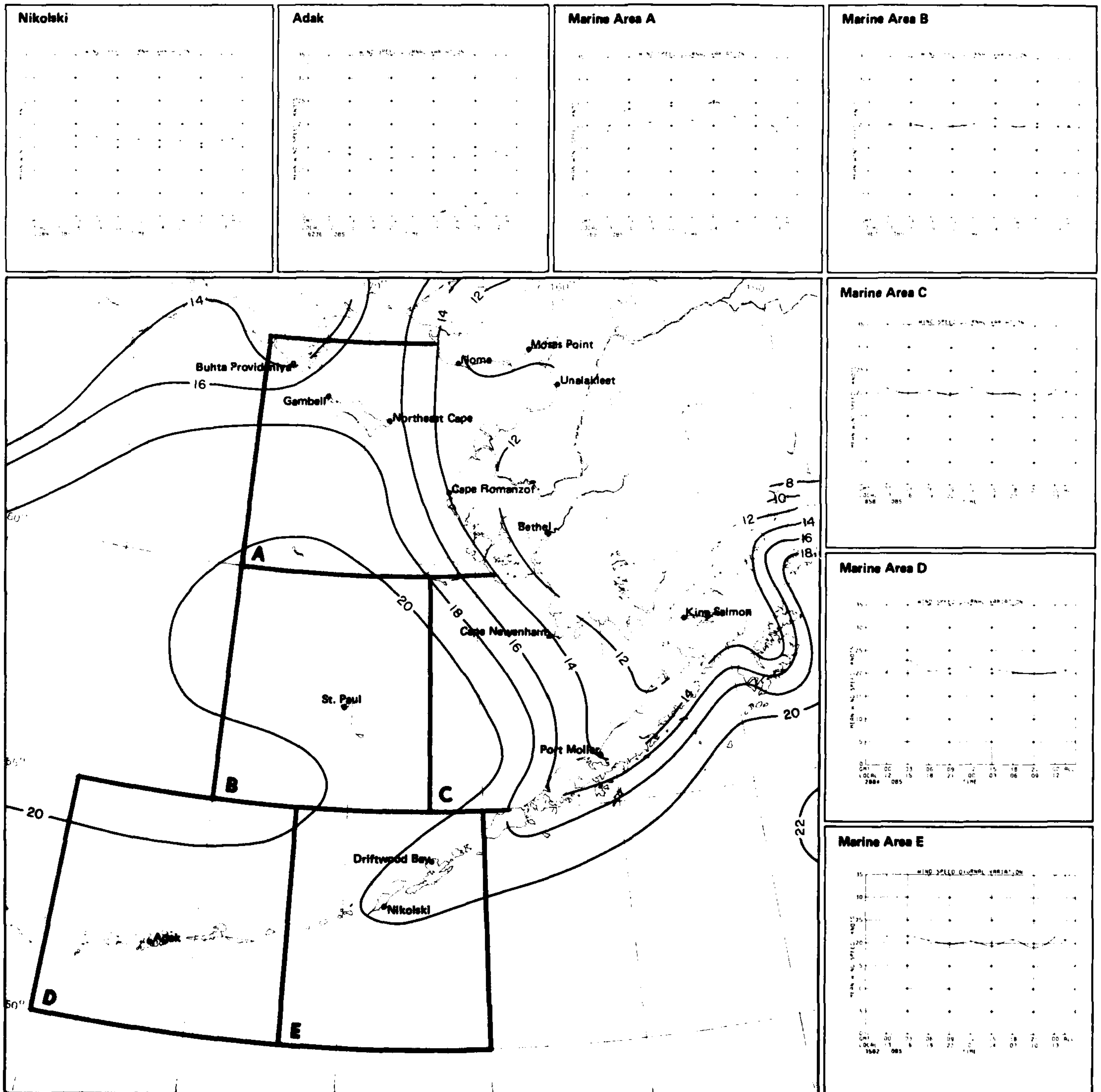


Port Moller



Driftwood Bay





11 Scalar mean wind

November

Legend

Low cloud ceiling/visibility

VISIBILITY

LOW CLOUD CEILING

	<½	½<1	1<2	2<5	5<10	≥10
NC	0	0	•	3	13	64
50<80	0	0	0	0	•	1
35<50	0	•	0	0	0	4
20<35	0	•	1	1	2	2
10<20	0	•	1	1	2	1
6<10	0	1	0	•	•	0
3<6	•	•	0	•	•	0
1.5<3	•	0	0	0	0	0
0<1.5	•	0	0	0	0	0

334

Percent frequency of simultaneous occurrence of specified low cloud ceilings (hundreds of feet) and visibilities (nautical miles)

Low cloud ceiling heights are estimated from the height of low clouds (h) when low cloud amount (N_h) is ≥5/8

Obscurations are included under ceiling 0<1.5

N.C. (no ceiling) includes bases of clouds ≥8000 feet as well as occurrences of N_h <5/8

12% of all observations reported ceiling ≥1000 but <2000 feet simultaneously with visibility ≥5 but <10 nautical miles.

• indicates < 5% but >0

Number of observations

Map · Low cloud ceiling and visibility thresholds

BLACK LINE Percent frequency of low cloud ceiling ≥1000 feet or no low cloud ceiling and visibility ≥5 nautical miles

BLUE LINE Percent frequency of low cloud ceiling <600 feet and or visibility <2 nautical miles

Buhta Provideniya

Gambell

VISIBILITY

LOW CLOUD CEILING

	<½	½<1	1<2	2<5	5<10	≥10
NC	•	•	•	•	4	7
50<80	[illegible]	[illegible]	[illegible]	•	1	1
35<50	[illegible]	[illegible]	[illegible]	•	1	1
20<35	•	[illegible]	•	1	7	8
10<20	1	•	•	[illegible]	14	9
6<10	•	1	[illegible]	4	8	4
3<6	1	1	1	1	1	•
1.5<3	•	•	•	[illegible]	•	0
0<1.5	[illegible]	[illegible]	1	•	•	0

1196

Northeast Cape

VISIBILITY

LOW CLOUD CEILING

	<½	½<1	1<2	2<5	5<10	≥10
NC	•	•	1	1	8	10
50<80	0	•	0	•	•	•
35<50	0	•	0	•	•	•
20<35	•	•	1	3	13	6
10<20	•	1	3	9	17	3
6<10	•	•	2	3	3	1
3<6	•	•	•	1	1	•
1.5<3	0	0	0	0	•	0
0<1.5	4	3	2	•	•	0

2347

Nome

VISIBILITY

LOW CLOUD CEILING

	<½	½<1	1<2	2<5	5<10	≥10
NC	•	•	•	•	8	39
50<80	0	0	•	•	1	[illegible]
35<50	0	•	•	•	1	2
20<35	•	•	•	2	[illegible]	3
10<20	•	•	1	3	5	3
6<10	•	•	1	2	2	•
3<6	•	•	1	1	•	•
1.5<3	•	•	•	•	•	0
0<1.5	3	2	1	1	0	0

7085

Moses Point

Unalakleet

VISIBILITY

LOW CLOUD CEILING

	<½	½<1	1<2	2<5	5<10	≥10
NC	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
50<80	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
35<50	[illegible]	[illegible]	[illegible]	[illegible]	4	[illegible]
20<35	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
10<20	[illegible]	[illegible]	[illegible]	[illegible]	4	[illegible]
6<10	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3<6	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1.5<3	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
0<1.5	[illegible]	2	1	1	•	[illegible]

1[illegible]19

Cape Romanzof

VISIBILITY

LOW CLOUD CEILING

	<½	½<1	1<2	2<5	5<10	≥10
NC	•	1	•	2	17	16
50<80	•	•	•	•	1	1
35<50	•	•	•	1	2	1
20<35	•	1	•	2	13	4
10<20	•	1	1	4	11	2
6<10	•	1	1	3	3	1
3<6	•	1	•	1	1	•
1.5<3	•	0	0	0	0	0
0<1.5	4	2	1	•	•	0

2331

Bethel

VISIBILITY

LOW CLOUD CEILING

	<½	½<1	1<2	2<5	5<10	≥10
NC	•	•	•	1	9	39
50<80	•	0	•	•	1	3
35<50	0	•	•	•	2	4
20<35	•	•	•	1	5	7
10<20	•	•	•	2	5	3
6<10	•	•	1	2	3	1
3<6	•	•	•	1	1	•
1.5<3	•	•	•	•	•	0
0<1.5	2	1	2	1	•	0

5725

Cape Newenham

VISIBILITY

LOW CLOUD CEILING

	<½	½<1	1<2	2<5	5<10	≥10
NC	•	•	•	1	[illegible]	[illegible]
50<80	0	0	0	•	•	1
35<50	0	0	[illegible]	•	1	1
20<35	•	•	•	1	[illegible]	4
10<20	[illegible]	•	1	4	14	6
6<10	•	1	2	4	6	[illegible]
3<6	•	1	1	2	4	1
1.5<3	0	•	•	•	0	0
0<1.5	3	2	1	1	0	0

2365

King Salmon

VISIBILITY

LOW CLOUD CEILING

	<½	½<1	1<2	2<5	5<10	≥10
NC	1	•	•	1	10	46
50<80	0	•	•	•	1	4
35<50	•	•	0	•	2	4
20<35	0	•	•	1	3	5
10<20	•	•	•	1	4	3
6<10	•	•	•	1	2	1
3<6	•	•	1	1	1	•
1.5<3	•	•	•	•	•	•
0<1.5	2	[illegible]	1	•	•	0

6182

St. Paul

VISIBILITY

LOW CLOUD CEILING

	<½	½<1	1<2	2<5	5<10	≥10
NC	•	0	•	1	21	7
50<80	0	0	0	0	1	•
35<50	0	0	0	•	2	1
20<35	•	•	•	1	12	5
10<20	•	•	1	6	21	3
6<10	•	•	1	4	4	•
3<6	•	1	1	1	1	•
1.5<3	•	•	•	•	•	0
0<1.5	1	1	1	•	•	0

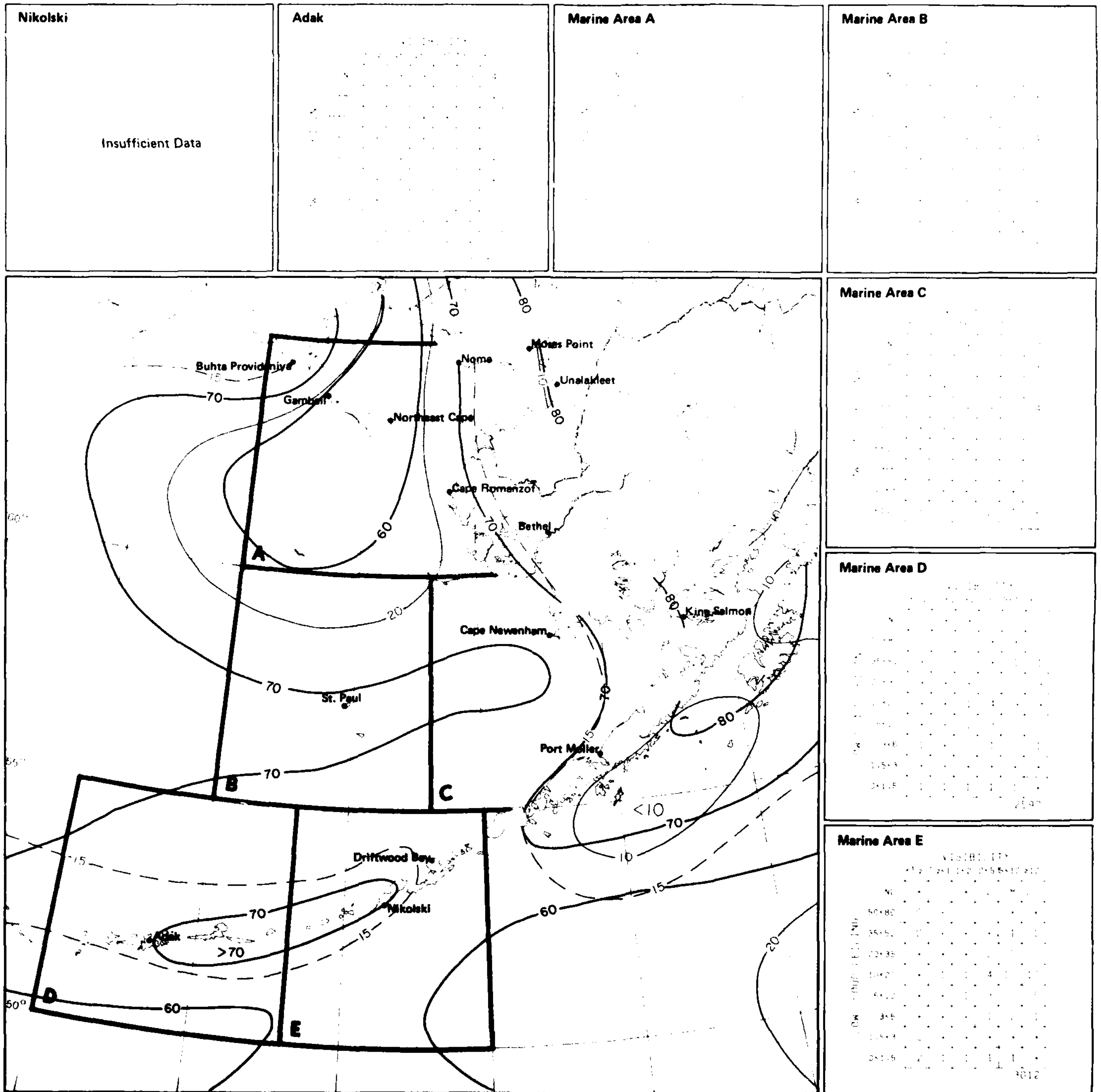
4200

Port Moller

Insufficient Data

Driftwood Bay

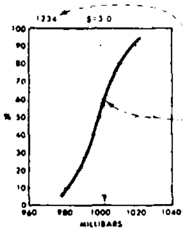
Insufficient Data



12 Low cloud ceiling and visibility thresholds **November**

Legend

Sea level pressure



Number of observations

Cumulative percent frequency of sea level pressures equal to or less than the pressure intersected by the curve

S Standard deviation of pressure mbs

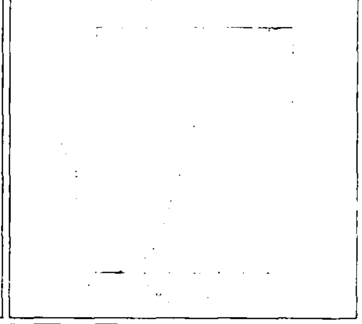
60% of all observed sea level pressures were ≤1002 millibars

Map - Mean sea level pressure

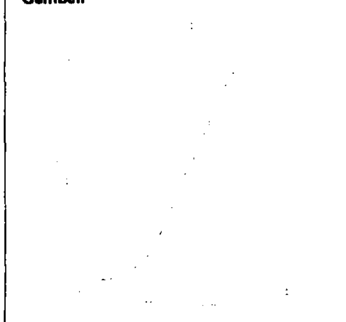
BLACK LINE Mean sea level pressure millibars

Sea level pressure is one of the most frequently recorded elements but one of the least accurate because of instrument and coding errors. Despite the inaccuracies of the individual readings, however, the large scale patterns and mean gradients of the isopleth analyses are relatively accurate.

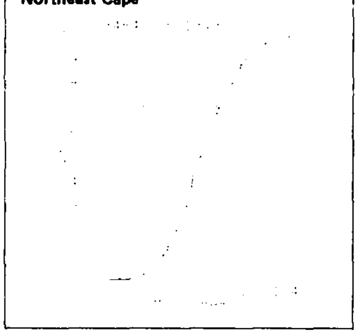
Buhta Provideniya



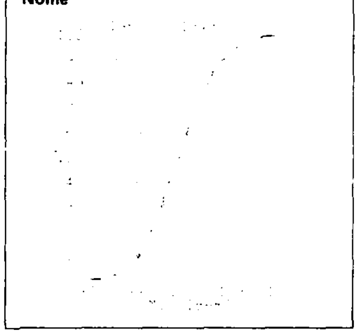
Gambell



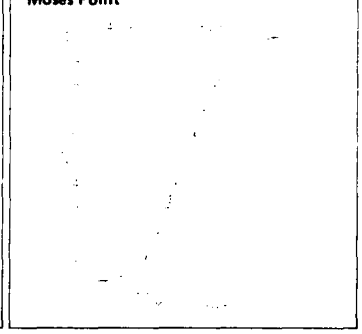
Northeast Cape



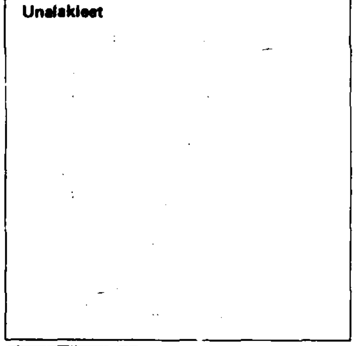
Nome



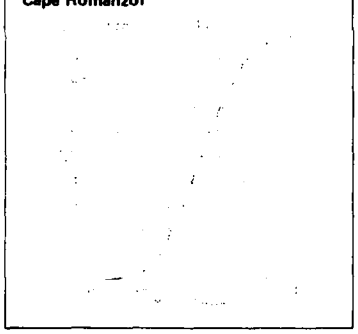
Moses Point



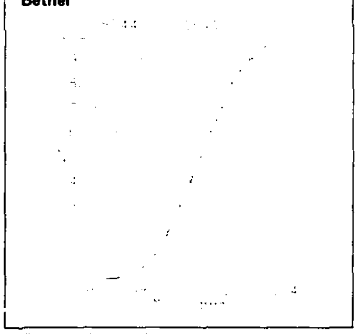
Unalakleet



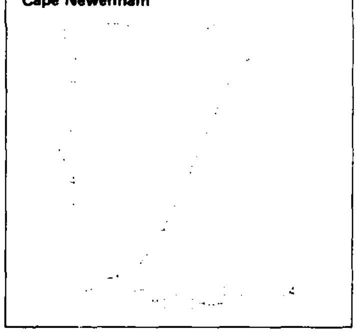
Cape Romanzof



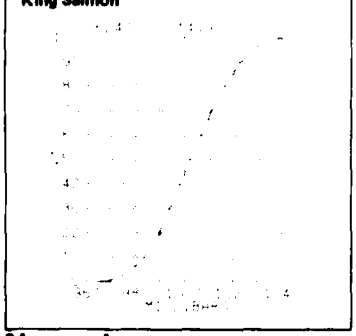
Bethel



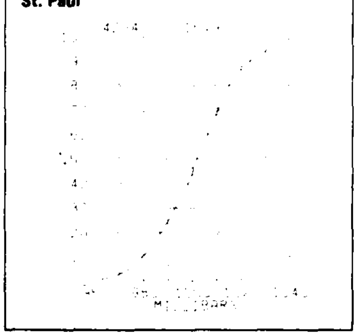
Cape Newenham



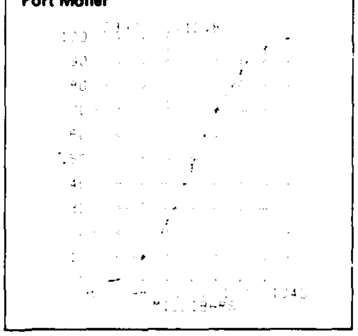
King Salmon



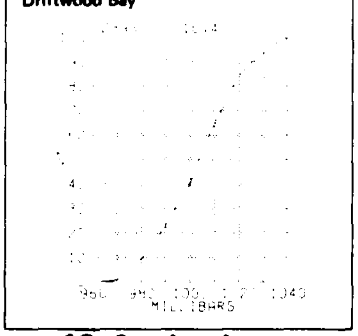
St. Paul

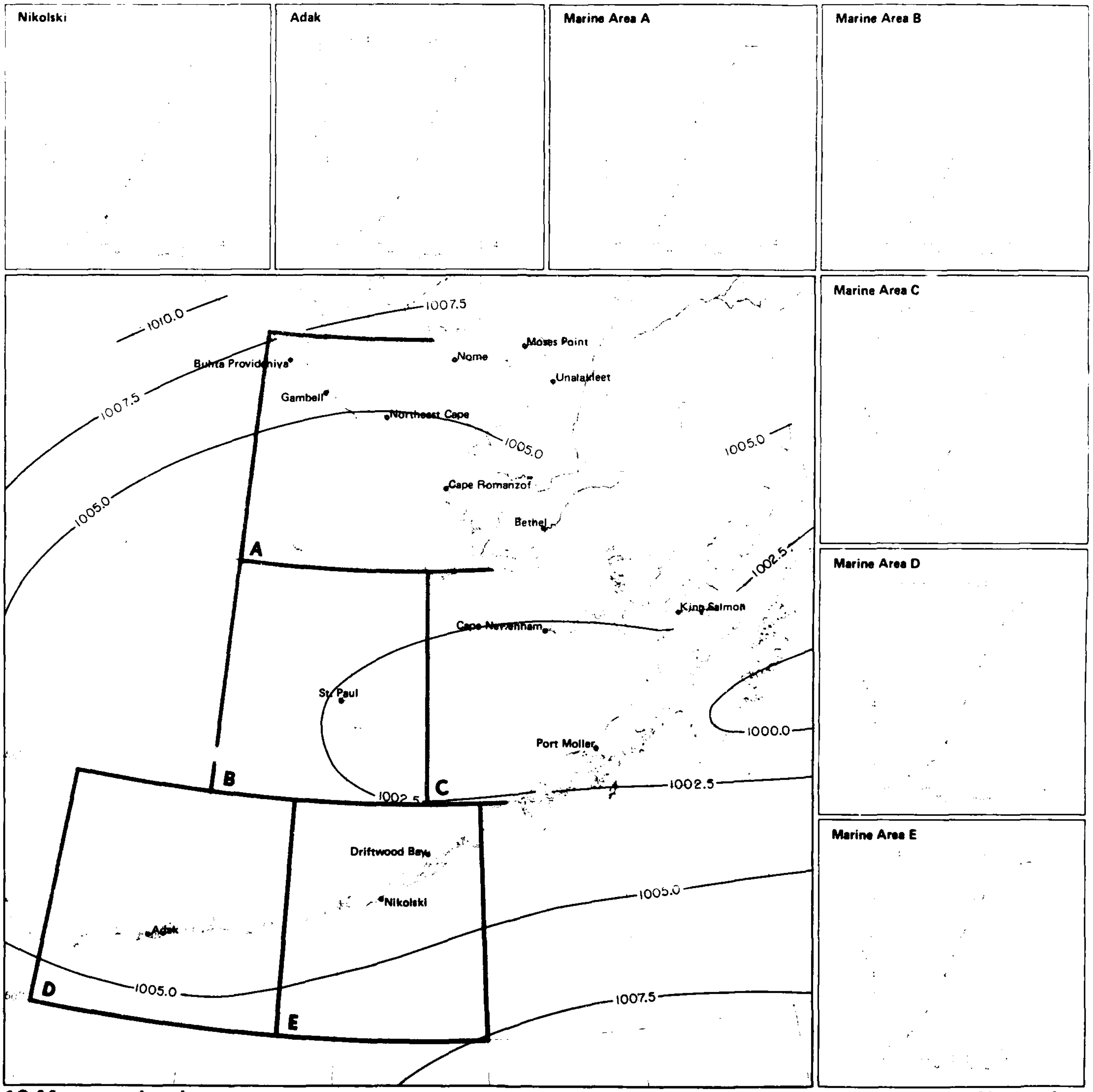


Port Moller



Driftwood Bay



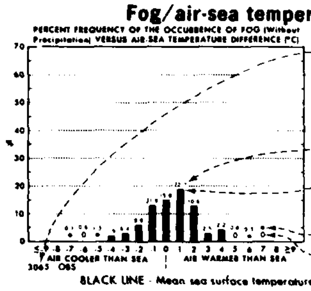


13 Mean sea level pressure

November

Legend

Fog/air-sea temperature difference



Number of observations

Bars show the percentage of observations with Fog (without Precipitation) for each Air Sea temperature difference category. Plotted numbers indicate the percentage of observations in each Air-Sea temperature difference category

(22.7% of all observations had Air-Sea temperature difference of +1 °C)

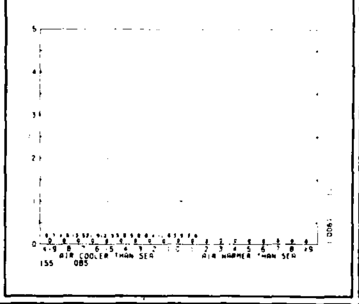
(19% of all observations with Air-Sea temperature difference of +1 °C were accompanied by Fog (without Precipitation))

• indicates < 0.5% but > 0

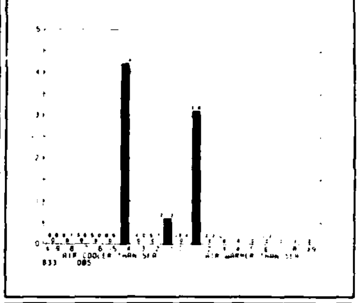
0 indicates no fog with the Air-Sea temperature difference category

BLACK LINE - Mean sea surface temperature (°C)

Marine Area A

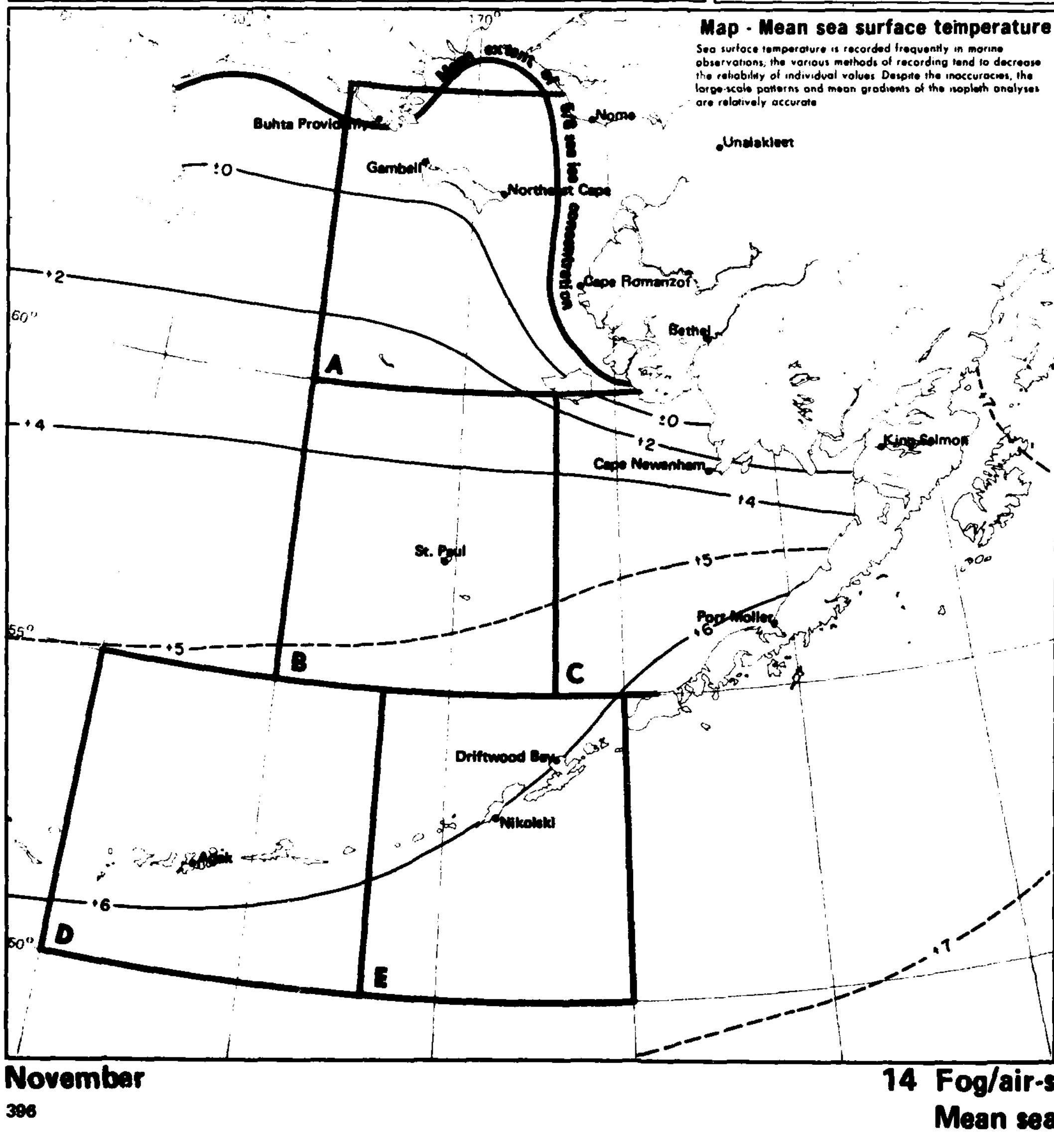


Marine Area B

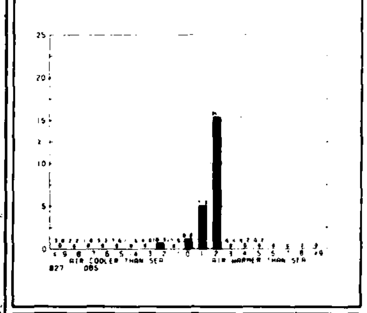


Map - Mean sea surface temperature

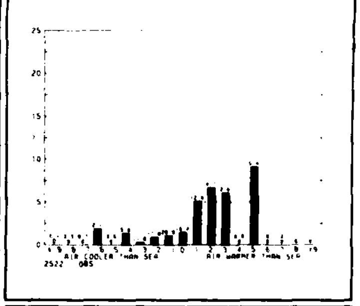
Sea surface temperature is recorded frequently in marine observations; the various methods of recording tend to decrease the reliability of individual values. Despite the inaccuracies, the large-scale patterns and mean gradients of the isopleth analyses are relatively accurate



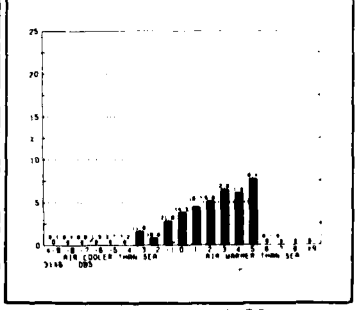
Marine Area C



Marine Area D



Marine Area E

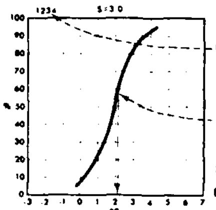


November

14 Fog/air-sea temperature difference
Mean sea surface temperature

Legend

Sea surface temperature



Number of observations

Cumulative percent frequency of sea surface temperatures equal to or less than the temperature intersected by the curve

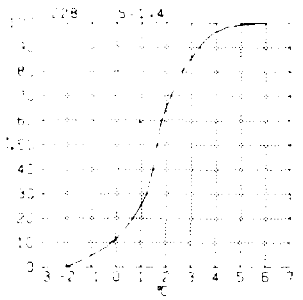
(60% of all observed sea surface temperatures were ≤2.1°C or ≤35.8°F)

S = Standard deviation of sea surface temperatures (°C)

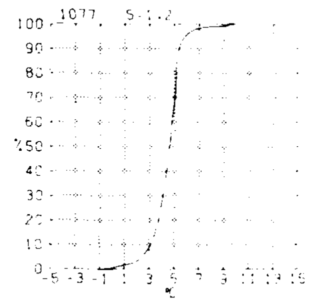
BLACK LINE · Maximum (99%) sea surface temperature (°C) (1% of the temperatures were greater than the given value)

BLUE LINE · Minimum (1%) sea surface temperature (°C) (1% of the temperatures were equal to or less than the given value)

Marine Area A

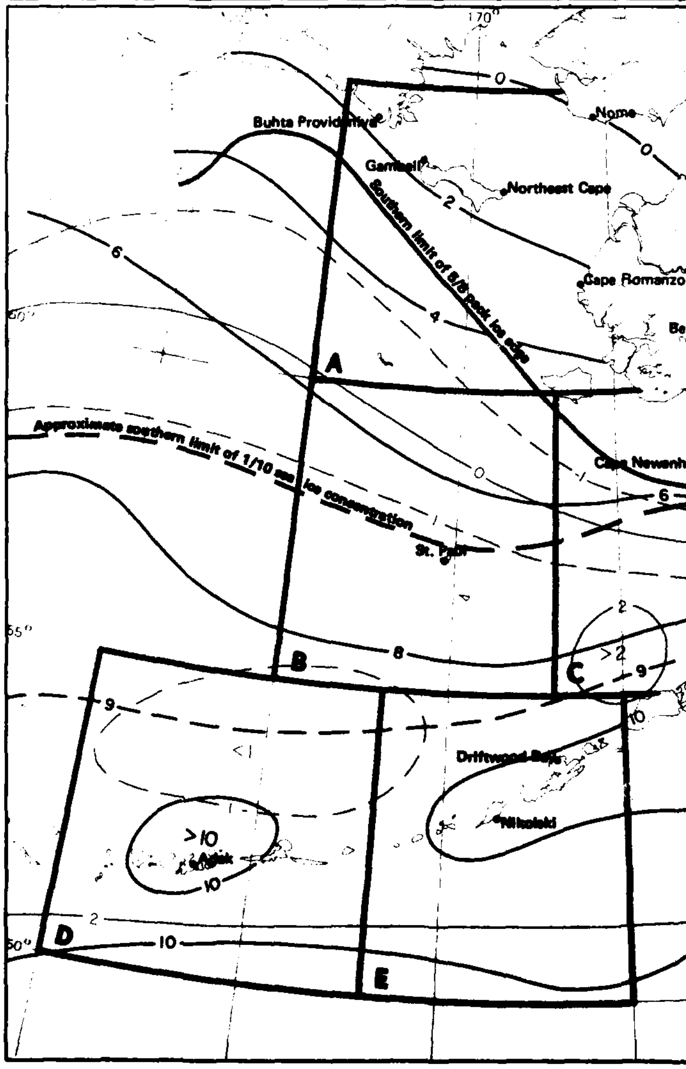


Marine Area B

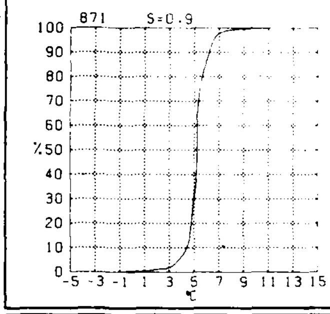


Map - Sea surface temperature extremes (°C)

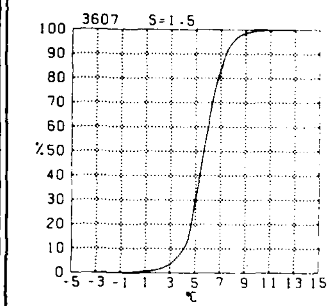
The percentage of temperatures greater than a given value can be obtained from the graph by subtracting the cumulative frequency of that value from 100%. The number of observations and the standard deviation are based on all observations reporting sea surface temperature. The isopleths representing extreme conditions show the maximum (99%) and the minimum (1%) levels of sea surface temperature. The various methods of recording the sea surface temperature tend to decrease the reliability of the individual values. Gradients and relative values of the isopleths, however, are considered reliable.



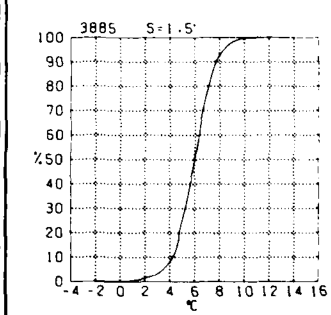
Marine Area C



Marine Area D



Marine Area E

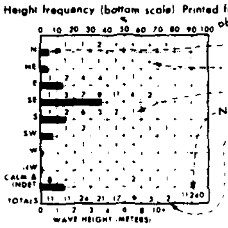


Legend

Wave height/direction

Direction frequency (top scale) Bars represent percent frequency of waves from each direction

Height frequency (bottom scale) Printed figures represent percent frequency of wave heights observed from each direction



WAVE HEIGHT INTERVAL

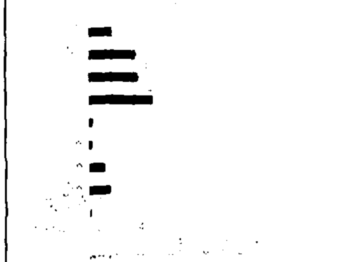
Feet	0-2	3-6	7-9	10-12	13-19	20-25	26-32	≥33
Meters	0-.5	1-1.5	2-2.5	3-3.5	4-5.5	6-7.5	8-9.5	≥10
	0	1	2	3	4	6	8	10+

Printed scale on bottom of chart

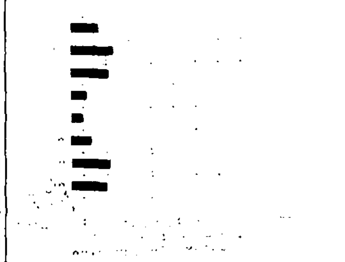
BLACK LINE Percent frequency of wave height <1.5 meters (<5 feet)

BLUE LINE Percent frequency of wave height <2.5 meters (<8 feet)

Marine Area A

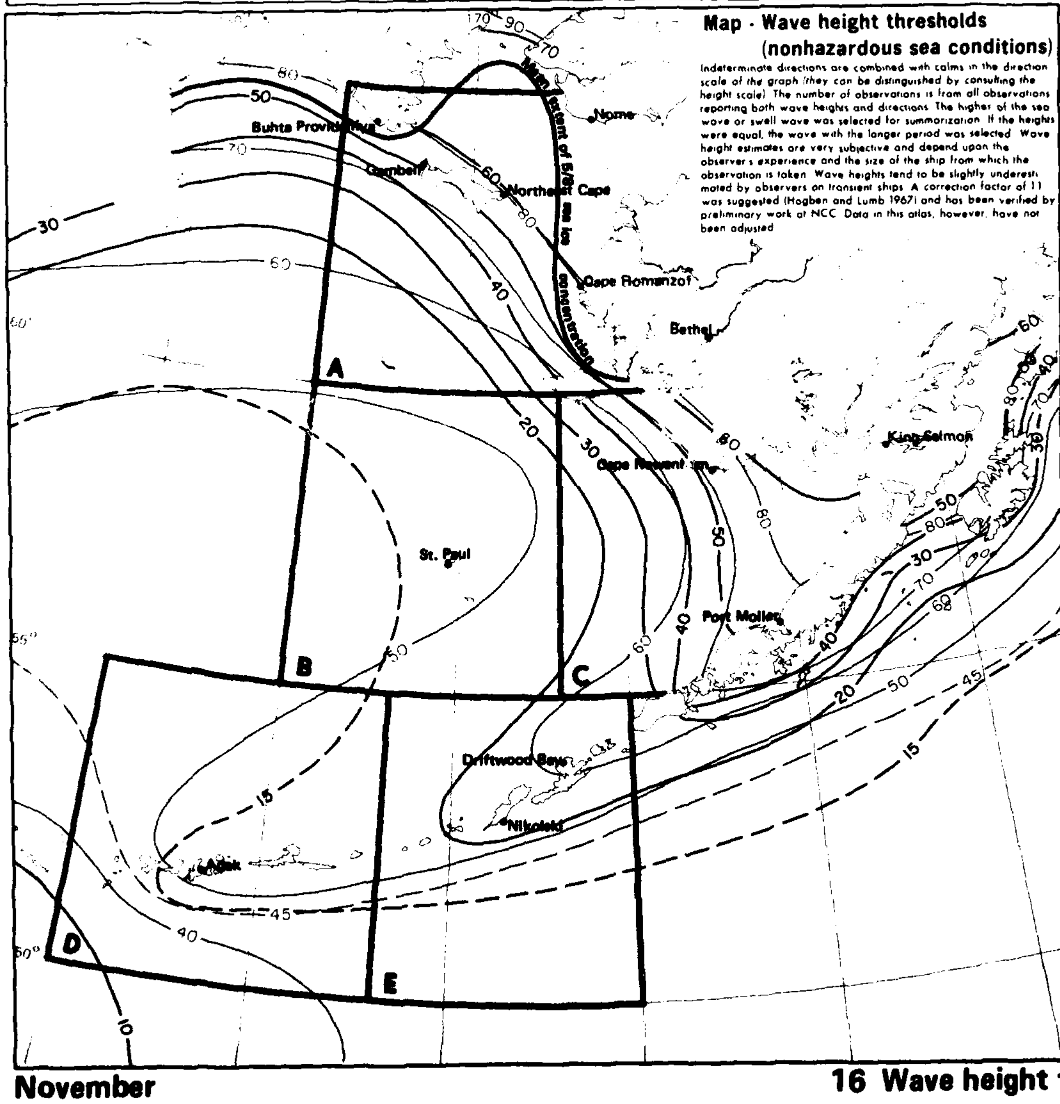


Marine Area B

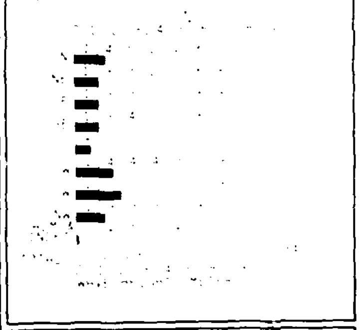


Map - Wave height thresholds (nonhazardous sea conditions)

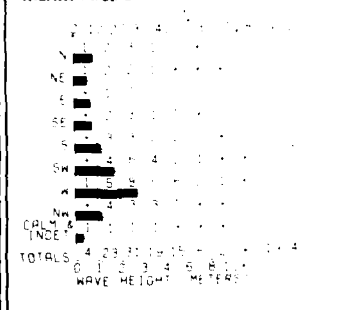
Indeterminate directions are combined with calms in the direction scale of the graph (they can be distinguished by consulting the height scale). The number of observations is from all observations reporting both wave heights and directions. The higher of the sea wave or swell wave was selected for summarization. If the heights were equal, the wave with the longer period was selected. Wave height estimates are very subjective and depend upon the observer's experience and the size of the ship from which the observation is taken. Wave heights tend to be slightly underestimated by observers on transient ships. A correction factor of 1.1 was suggested (Hogben and Lumb 1967) and has been verified by preliminary work at NCC. Data in this atlas, however, have not been adjusted.



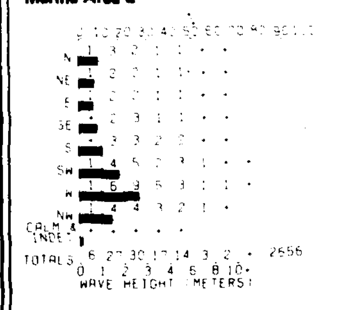
Marine Area C



Marine Area D



Marine Area E



November

16 Wave height thresholds (nonhazardous)

Legend

Wave height/period

PERIOD (Seconds)

[illegible]	21	3	1	+	+	+	6
[illegible]	22	16	6	2	1	+	+
[illegible]	3	6	4	3	1	+	+
[illegible]	+	1	1	1	1	+	+
[illegible]	+	+	+	+	+	+	0
[illegible]	0	+	+	0	0	+	0
[illegible]	0	0	0	+	0	0	0
[illegible]	0	0	0	0	0	+	0

4010

Percent frequency of occurrence of wave period and height

(2% of observed waves had a height of 1-1.5 meters and a period of 10-11 seconds.)

+ indicates < 5% but >0

Number of observations

Waves are selected on the basis of the higher of sea and swell when both are reported. If both heights are equal, the wave with the longer period is selected.

BLACK LINE - Percent frequency of wave height ≥3.5 meters (≥12 feet)

BLUE LINE - Percent frequency of wave height ≥6 meters (≥20 feet)

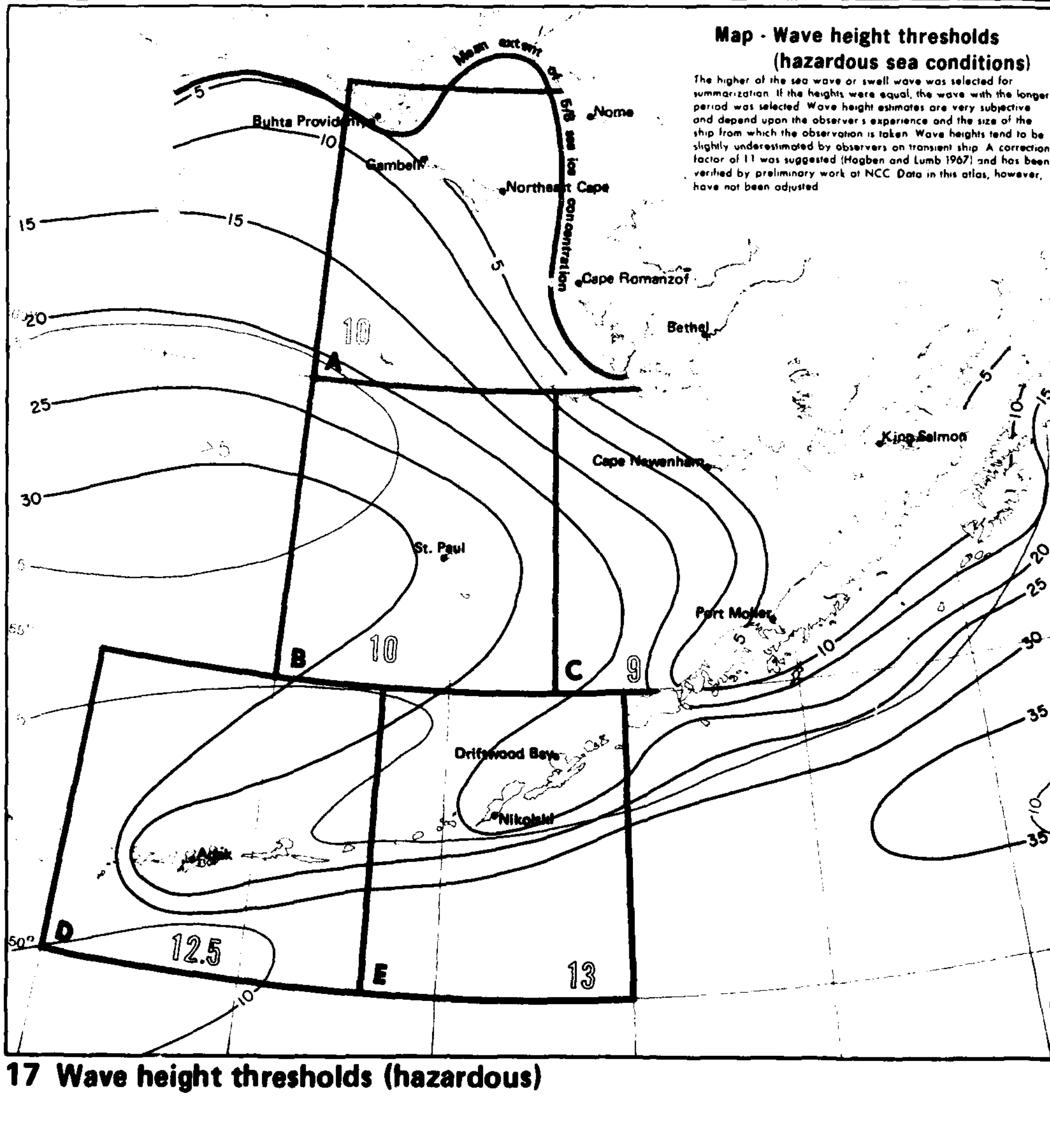
BLUE NUMBER - Maximum observed wave height (meters)

Marine Area A

Marine Area B

Map - Wave height thresholds (hazardous sea conditions)

The higher of the sea wave or swell wave was selected for summarization. If the heights were equal, the wave with the longer period was selected. Wave height estimates are very subjective and depend upon the observer's experience and the size of the ship from which the observation is taken. Wave heights tend to be slightly underestimated by observers on transient ship. A correction factor of 1.1 was suggested (Hogben and Lumb 1967) and has been verified by preliminary work at NCC. Data in this atlas, however, have not been adjusted.



Marine Area C

Marine Area D

1916

Marine Area E

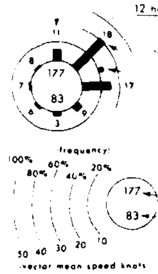
2696

17 Wave height thresholds (hazardous)

November

Legend

Low pressure center movement



12 hour movements of low pressure centers considering only closed circulations

Mean speed Printed figure at the end of each bar represents the mean speed of movement in knots toward the indicated direction

Low pressure centers moving toward the N had a mean speed of 11 knots

Direction frequency Bars represent percent frequency of 12 hour movements toward each direction. Each circle represents 20%

41% of all 12 hour movements were toward the NE

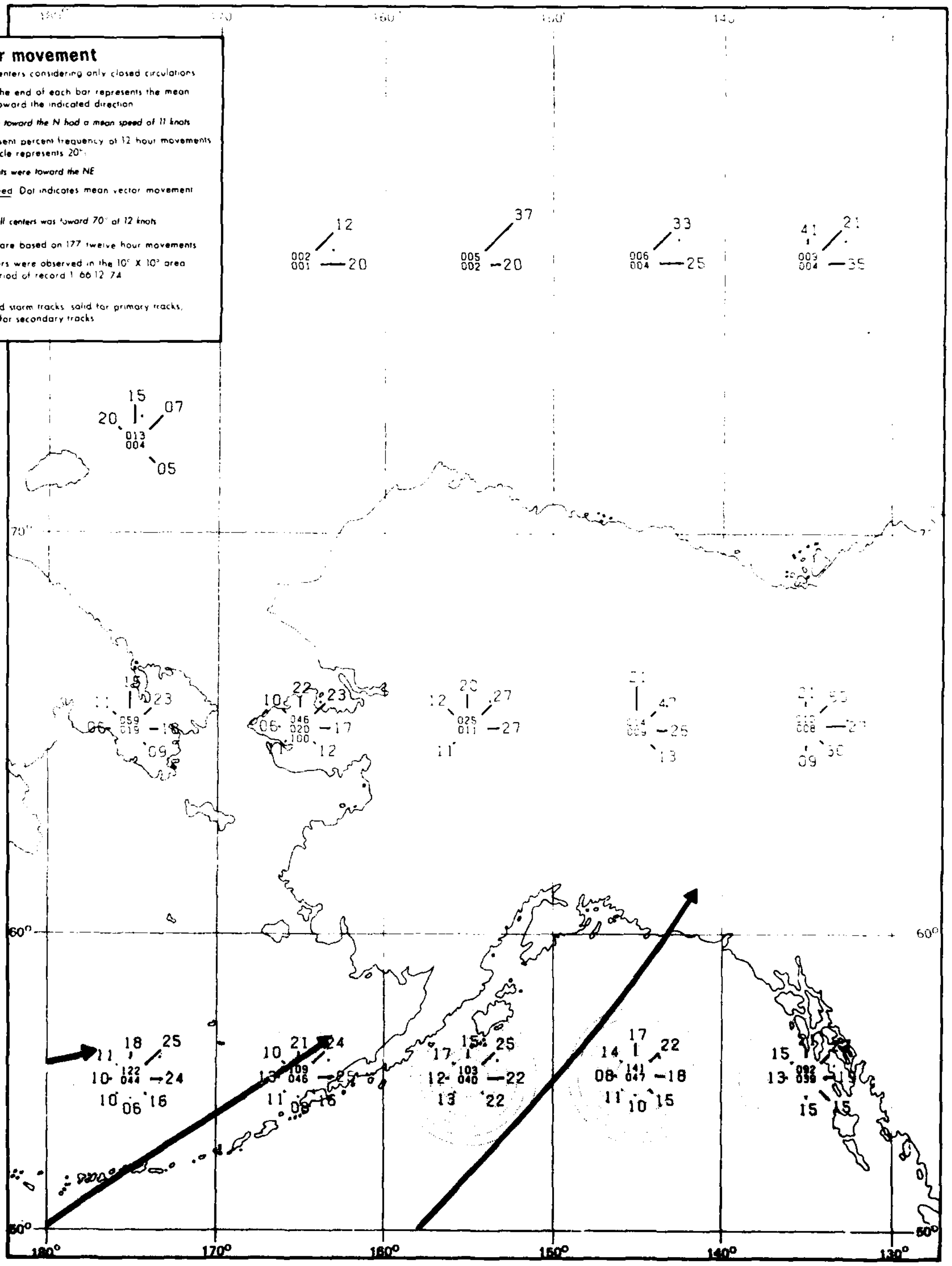
Vector mean direction and speed Dot indicates mean vector movement Each circle equals 10 knots

Mean vector movement of all centers was toward 70° at 12 knots

Statistics for this rose are based on 177 twelve hour movements

83 low pressure centers were observed in the 10° X 10° area during the 9 year period of record 1 66 12 74

BLACK ARROWS Preferred storm tracks solid for primary tracks, dashed for secondary tracks

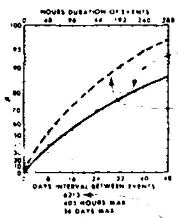


November

18 Low pressure center movement

Legend

Persistence of visibility <2 n. mi.



Hours duration of events   Days interval between events

Cumulative percent frequency of hours du on equal to or less than the number of hours intersected by the solid curve

(80% of the events had a duration ≤216 hours.)

Cumulative percent frequency of days interval between events equal to or less than the number of days intersected by the broken curve

(88% of the events were followed by another event in 28 days or less.)

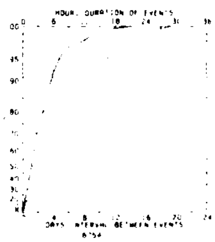
The maximum value(s) of hours duration and/or the days interval will be displayed when the graph limits are exceeded

Durations and intervals for a particular month extend from the time they begin (or the first of the month if already in progress) and are terminated at the actual ending time, regardless of what month that may be

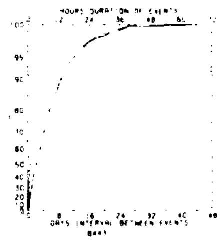
Number of observations

Top and bottom scales are variable to allow for variations in the data

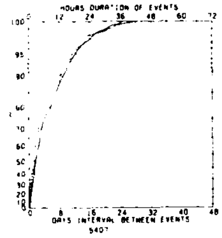
Adak



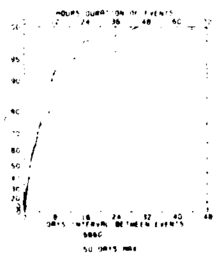
Nome



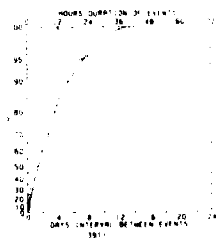
Moses Point



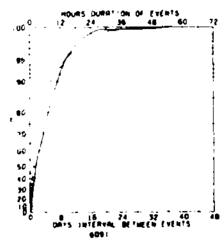
Unalakleet



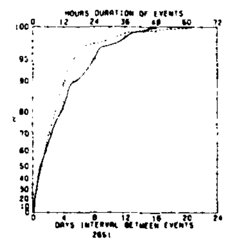
Cape Romanzof



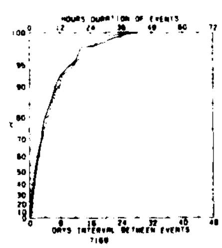
Bethel



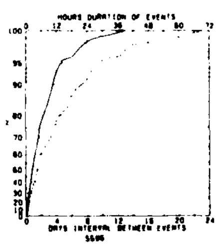
Nikolski



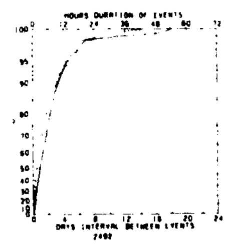
King Salm^n



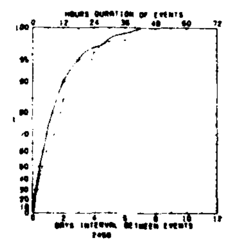
St. Paul



Port Moller



Driftwood Bay

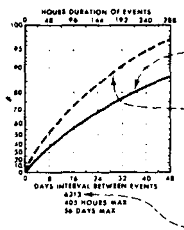


19 Persistence of visibility <2 n. mi. **November**

Legend

Persistence of wind ≥10 kts.

Hours duration of events · Days interval between events



Cumulative percent frequency of hours duration equal to or less than the number of hours intersected by the solid curve

(80% of the events had a duration ≤216 hours.)

Cumulative percent frequency of days interval between events equal to or less than the number of days intersected by the broken curve

(88% of the events were followed by another event in 28 days or less.)

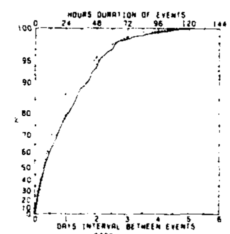
The maximum value(s) of hours duration and/or the days interval will be displayed when the graph limits are exceeded

Durations and intervals for a particular month extend from the time they begin (or the first of the month if already in progress) and are terminated at the actual ending time, regardless of what month that may be

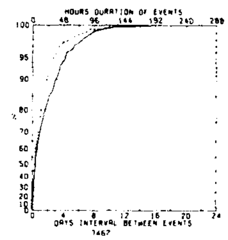
Number of observations

Top and bottom scales are variable to allow for variations in the data

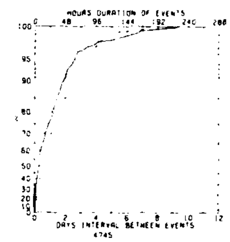
Adak



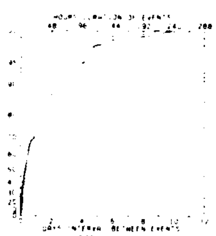
Nome



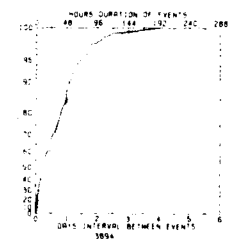
Moses Point



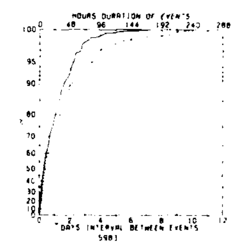
Unalakleet



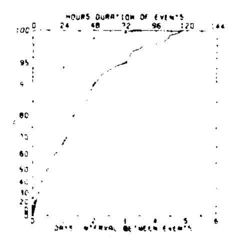
Cape Romanzof



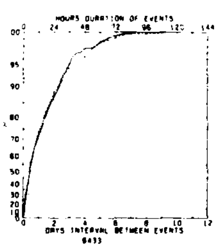
Bethel



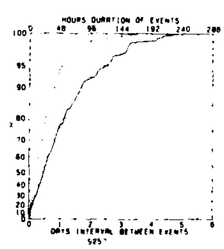
Nikolski



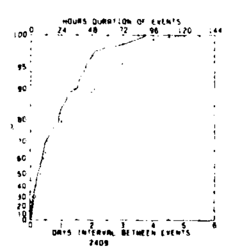
King Salmon



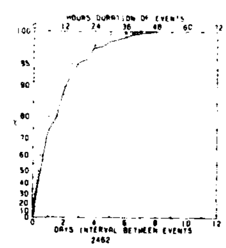
St. Paul



Port Moller

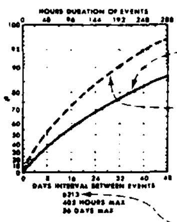


Driftwood Bay



Legend

Persistence of wind ≥20 kts.



Hours duration of events · Days interval between events

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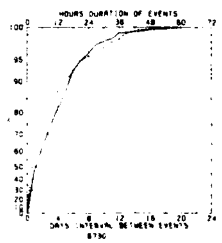
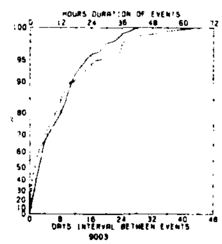
Number of observations

Top and bottom scales are variable to allow for variations in the data

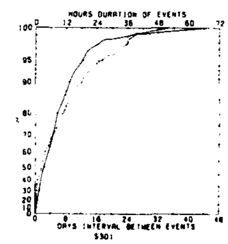
Adak



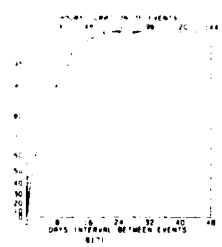
Nome



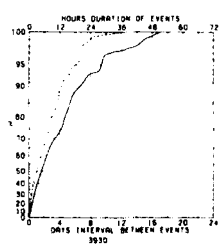
Moses Point



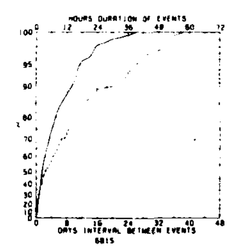
Unalakleet



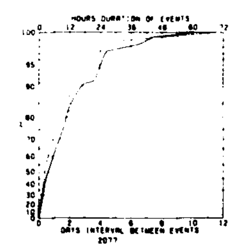
Cape Romanzof



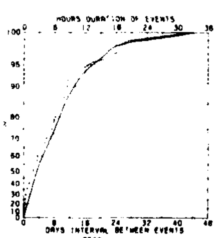
Bethel



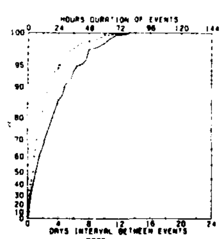
Nikolski



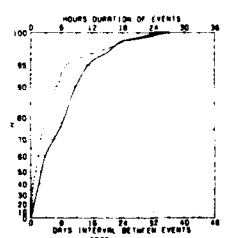
King Salmon



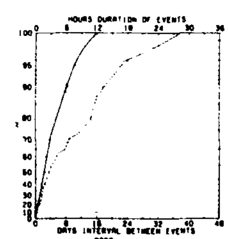
St. Paul



Port Moller



Driftwood Bay

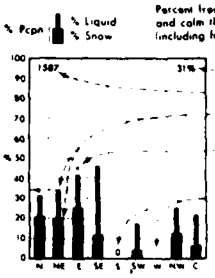


21 Persistence of wind ≥20 kts.

Legend

Precipitation/wind direction

Percent frequency of surface wind observations from each direction and calm that were accompanied by precipitation, subdivided into liquid type (including freezing rain and freezing drizzle) and snow



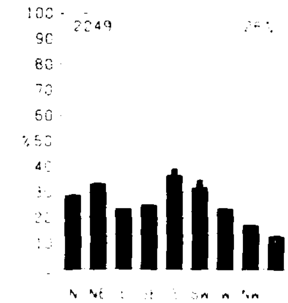
- Percentage of present weather observations reporting precipitation
- Number of observations
- (34% of all NE winds were accompanied by precipitation, of which 14% was liquid and 20% was snow)
- An asterisk in the column for a given direction (or calm) indicates that the percentage was based on 10 30 observations of present weather and wind direction
- 0 replaces bar when no precipitation was observed with winds from a given direction (or calm). No bar graph is presented if less than 10 observations containing present weather were reported for a given direction (or calm)

Map - Precipitation

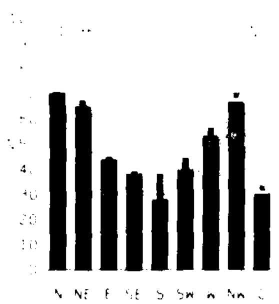
BLACK LINE - Percent frequency of observations reporting precipitation

Of all the elements recorded in historical marine observations, precipitation is one of those most subject to interpretation error, from coding practices, observers preference for certain present weather codes, and other biases

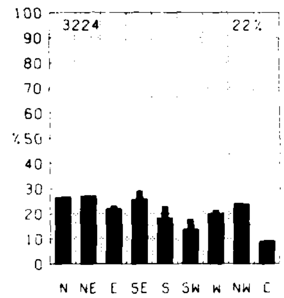
Buhta Provideniya



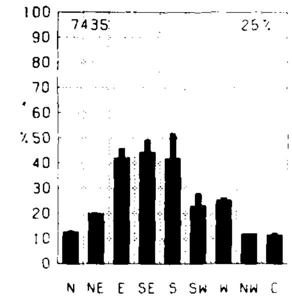
Gambell



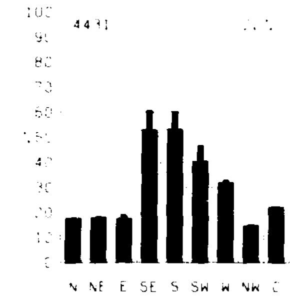
Northeast Cape



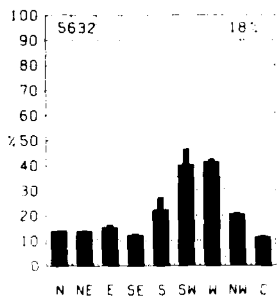
Nome



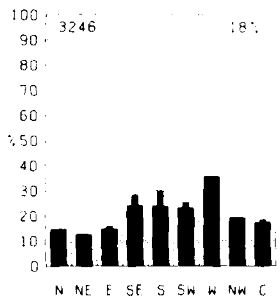
Moses Point



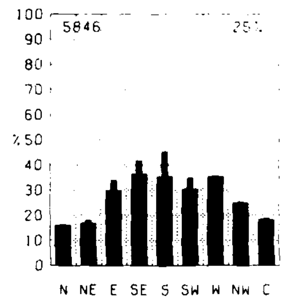
Unalakleet



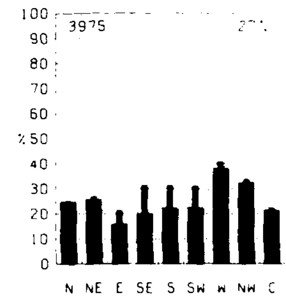
Cape Romanzof



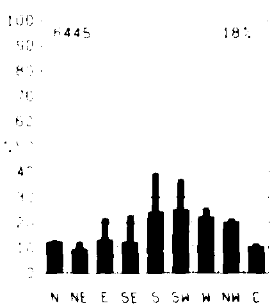
Bethel



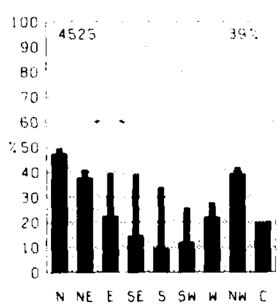
Cape Newenham



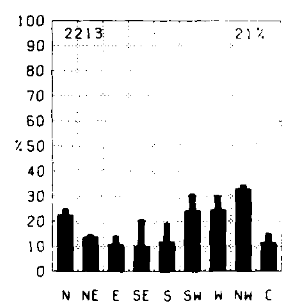
King Salmon



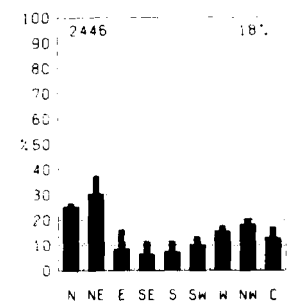
St. Paul

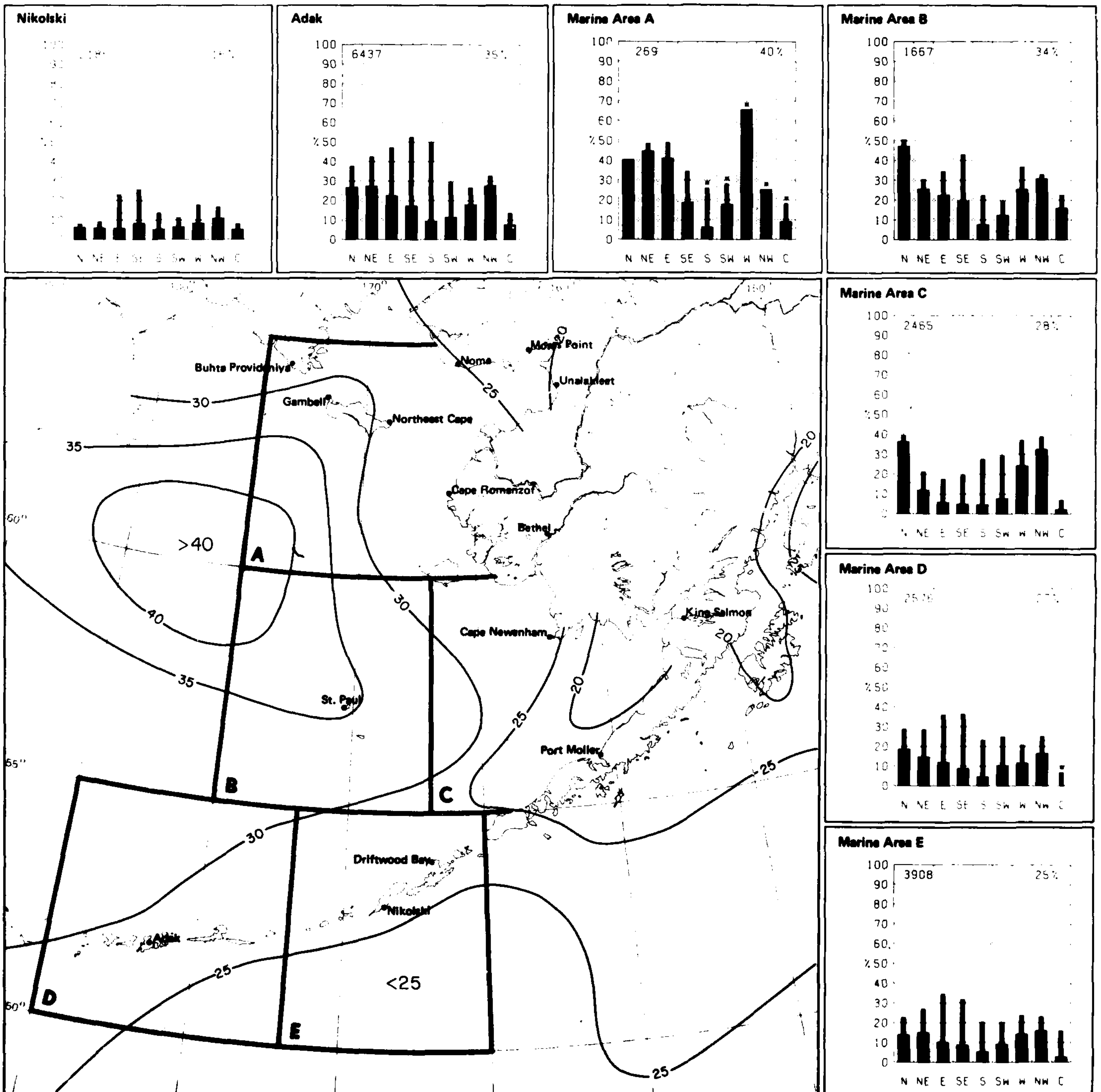


Port Moller



Driftwood Bay

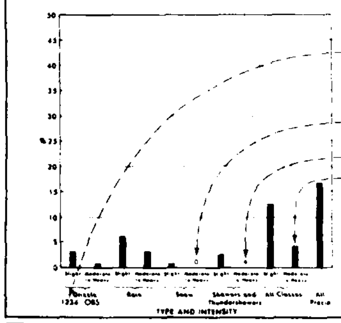




1 Precipitation December

Legend

Precipitation types



Percent frequency of precipitation by type and intensity

Number of observations

Bars show percent frequency of observations reporting Precipitation of various types and intensities

0 indicates no observations in the category

* indicates < 0.5% but >0

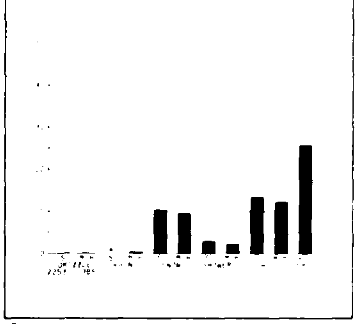
(4.0% of all observations recorded moderate to heavy precipitation)

Map - Snow

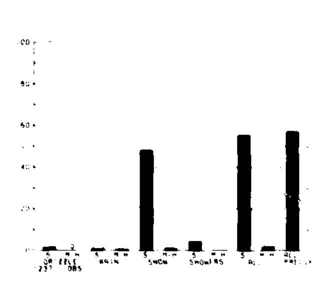
BLACK LINE Percent frequency of precipitation observations reporting snow

The percent frequency of observations reporting snow for a given point can be determined by multiplying the percent frequency of observations reporting precipitation (map 1) with that of precipitation observations reporting snow (map 2)

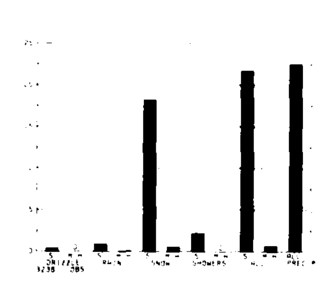
Buhta Provideniya



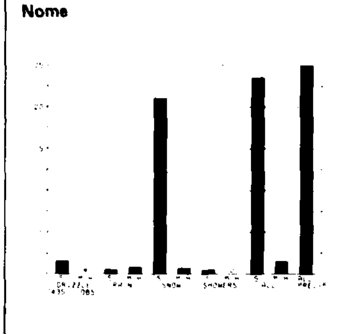
Gambell



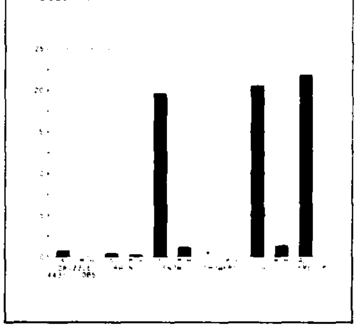
Northeast Cape



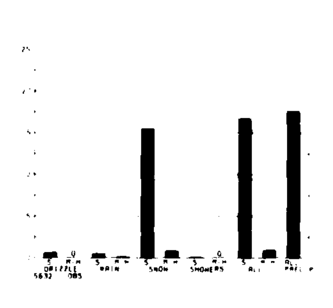
Nome



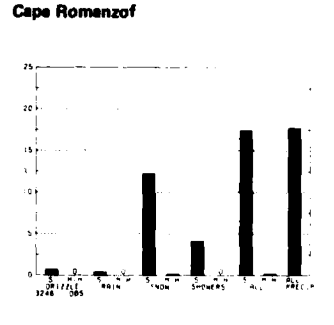
Moses Point



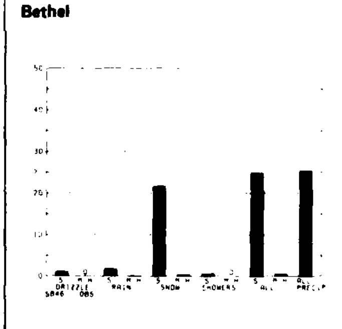
Unalakleet



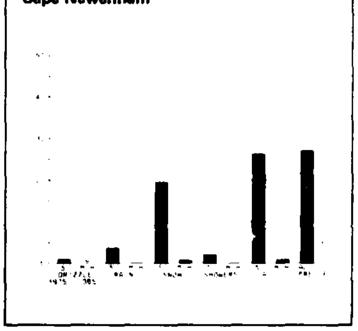
Cape Romanzof



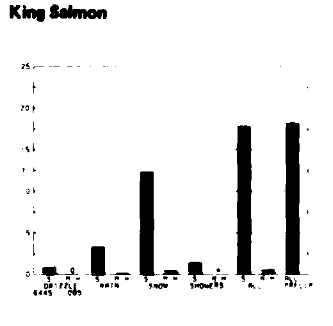
Bethel



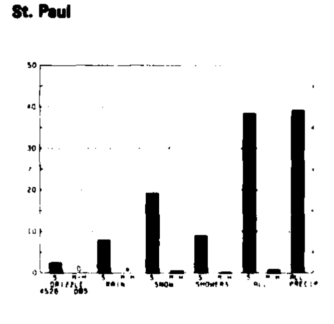
Cape Newenham



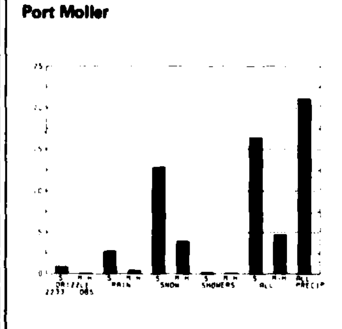
King Salmon



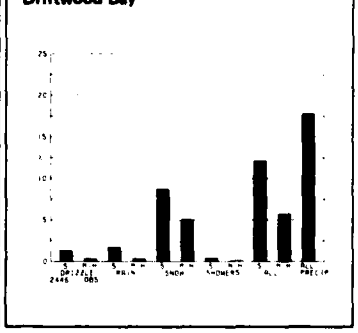
St. Paul

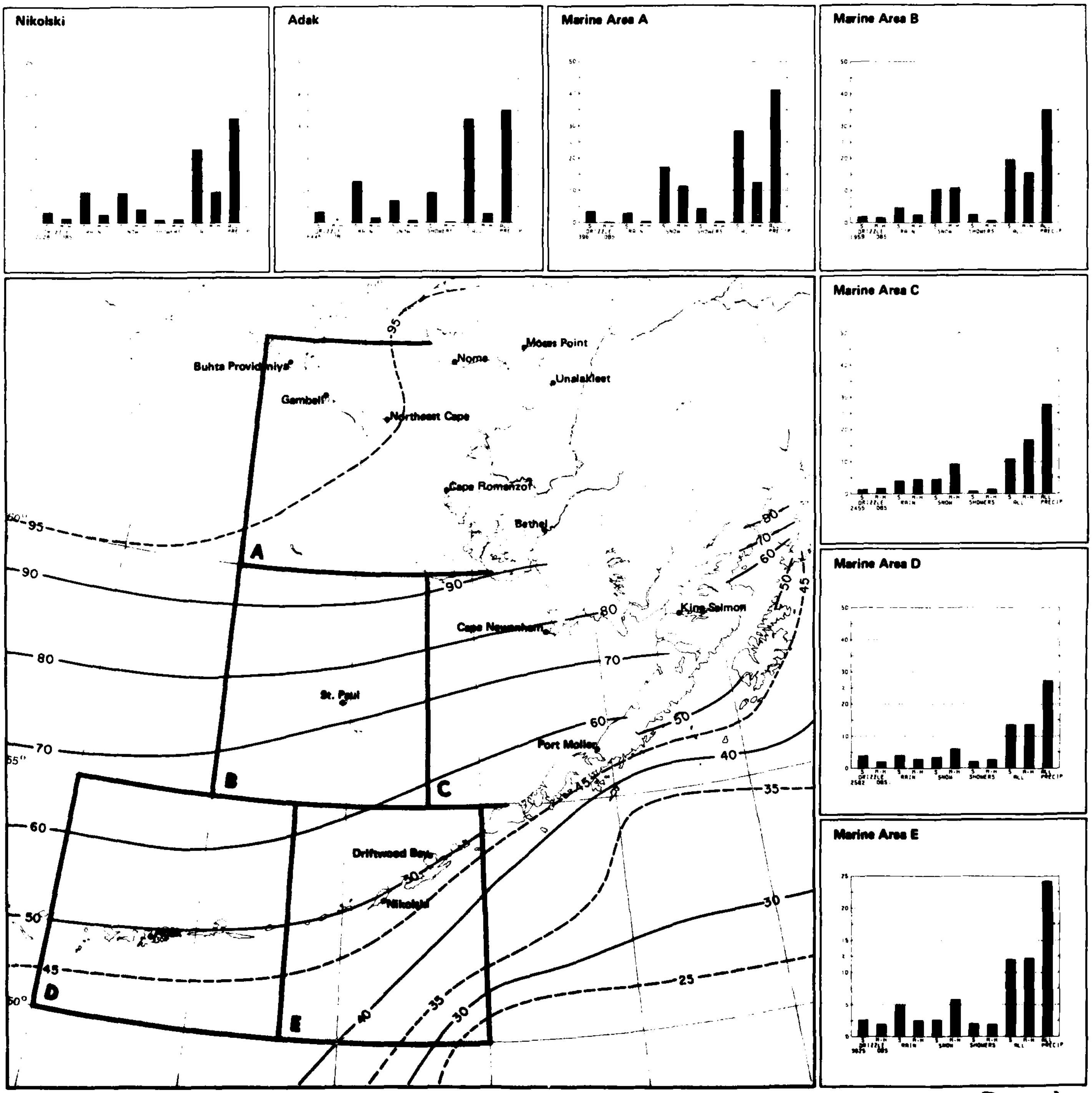


Port Moller



Driftwood Bay



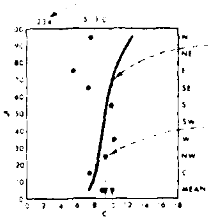


2 Snow

December

Legend

Air temperature/wind direction



Number of observations

Cumulative percent frequency of temperatures equal to or less than the temperature intersected by the curve

70% of all temperatures were ≤10.3 °C or ≤50.5 °F

S Standard deviation of temperatures °C

Mean temperature for each wind direction, calm and for all data combined are represented by dots

With NW winds, the mean temperature was 9.4 °C or 48.9 °F

Indicates that the mean temperature for a direction or calm was computed from 10-30 observations

The mean temperature is omitted when less than 10 observations for a direction or calm were available

Map - Air temperature mean and thresholds

BLACK LINE Percent frequency of temperature ≤0°C ≤32°F

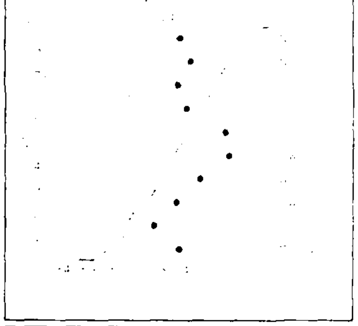
RED LINE Mean air temperature °C

BLUE LINE Percent frequency of wind chill temperature ≤ 30°C ≤ 22°F

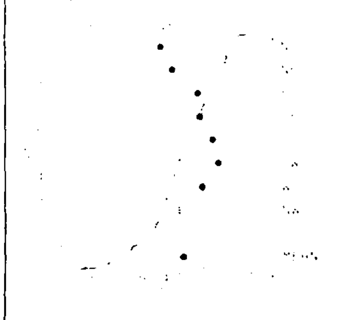
Air temperature readings recorded on transient ships in warm, sunny weather appear biased toward high temperatures, apparently because of improper instrument exposure and ventilation. Despite the inaccuracies, the large scale patterns and mean gradients of the isopleth analyses are relatively accurate.

The temperature scale of the graph may vary in both range and class interval. The percentage of temperature observations greater than a given value can be obtained by subtracting the cumulative percent frequency of that value from 100%. The number of observations and the standard deviation plus the plotted points on the graphs are based on those observations reporting both temperature and wind direction. The cumulative curve is based on all observations reporting temperature with or without wind direction.

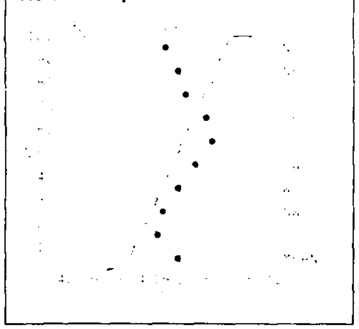
Buhta Provideniya



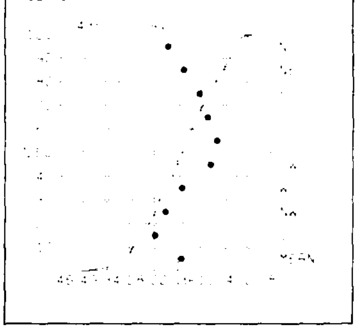
Gambell



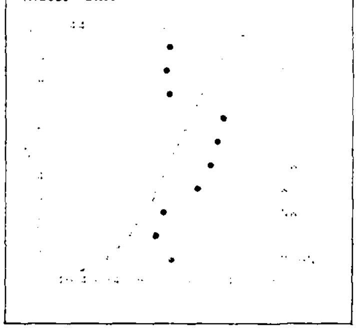
Northeast Cape



Nome

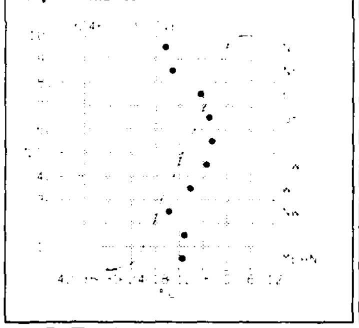


Moses Point

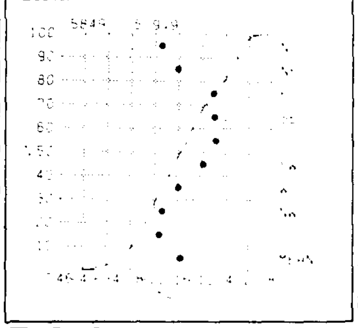


Unalakleet

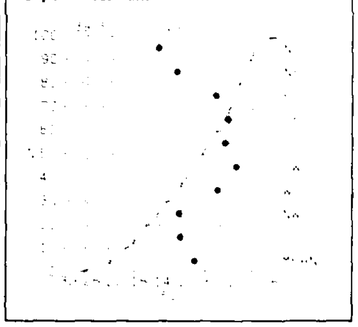
Cape Romanzof



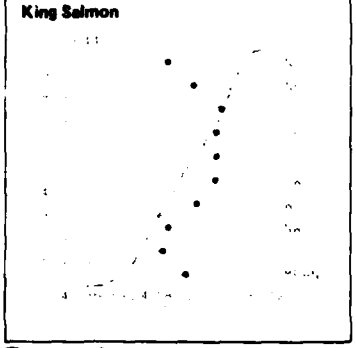
Bethel



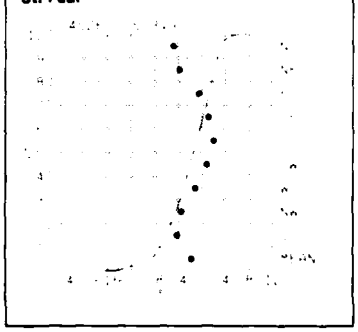
Cape Newenham



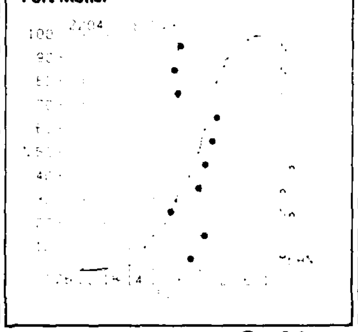
King Salmon



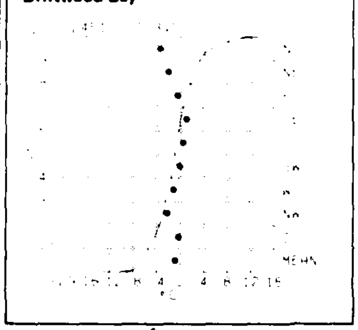
St. Paul

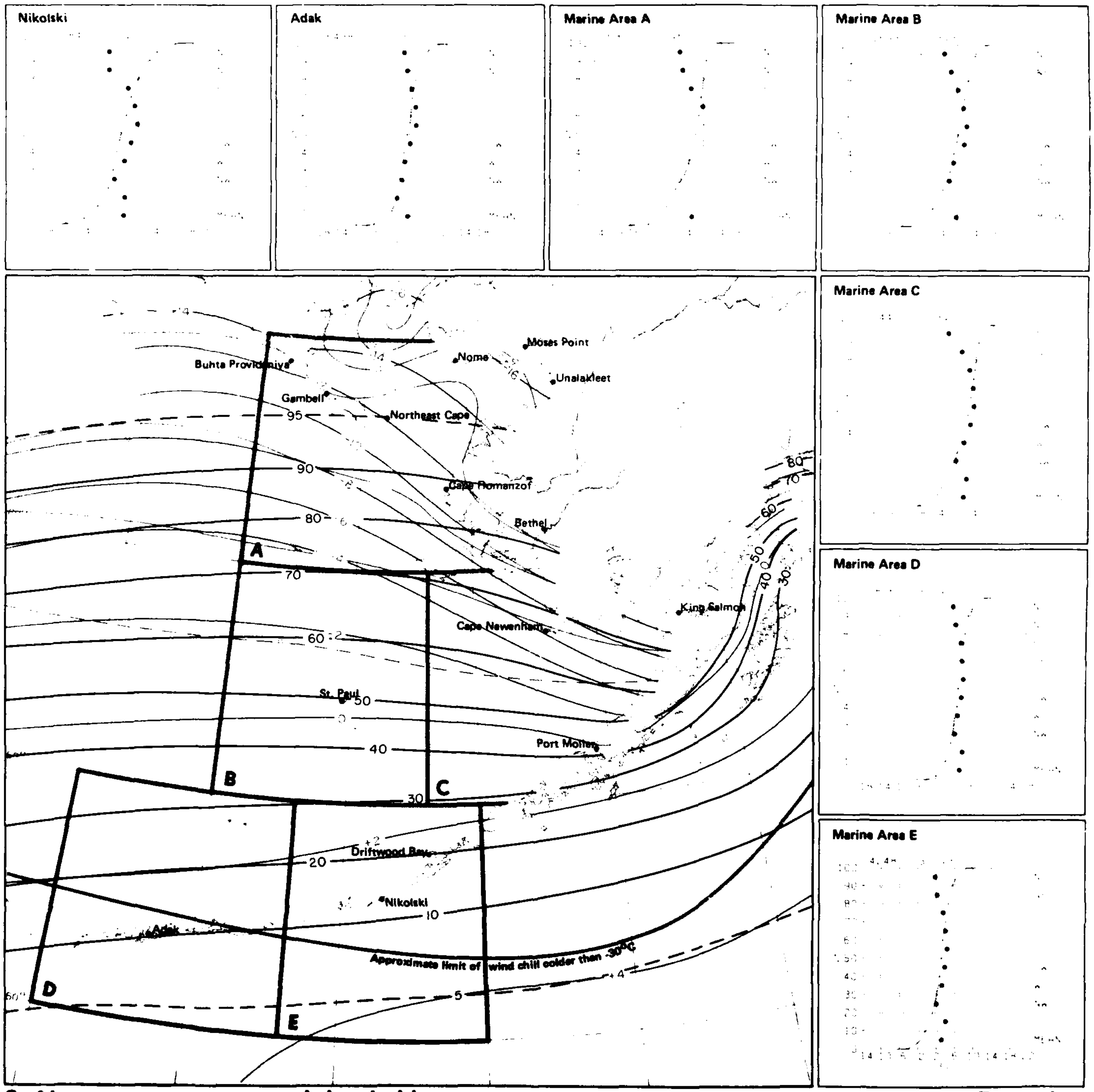


Port Moller



Driftwood Bay

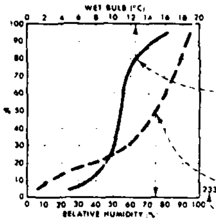




3 Air temperature mean and thresholds

Legend

Wet bulb/relative humidity



Cumulative percent frequency of wet bulb temperatures equal to or less than the temperature intersected by the curve (top scale)

Wet bulb (°C)

(80% of all observed wet-bulb temperatures were ≤12.5°C or 54.5°F)

Cumulative percent frequency of relative humidities equal to or less than the humidity intersected by the curve (bottom scale)

Relative humidity (%)

(50% of all observed relative humidities were ≤74%)

Number of observations

Map - Mean dew point temperature

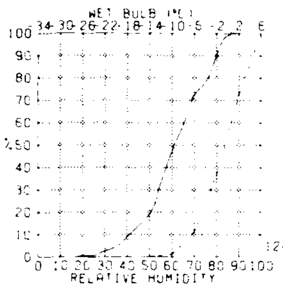
BLACK LINE Mean dew point temperature (°C)

The observation count of the graph reflects those observations reporting both air and wet bulb temperatures, both are required in computing the relative humidity. The percentage of observations of either element greater than a given value can be obtained by subtracting the cumulative percent frequency of that value from 100%.

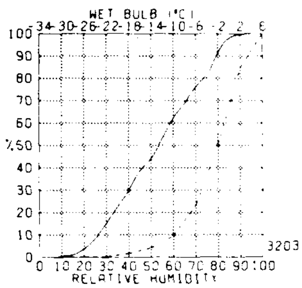
Buhta Provideniya

Insufficient Data

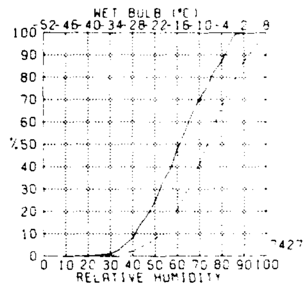
Gambell



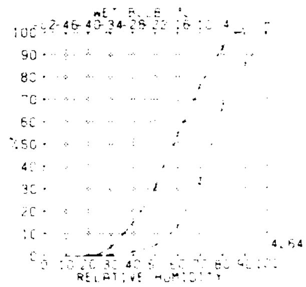
Northeast Cape



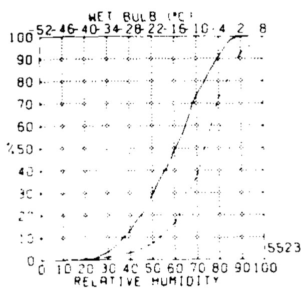
Nome



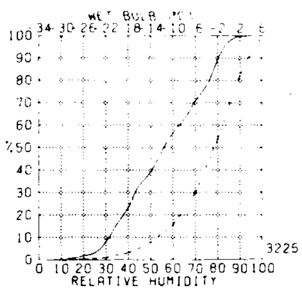
Moses Point



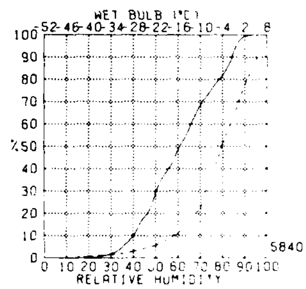
Unalakleet



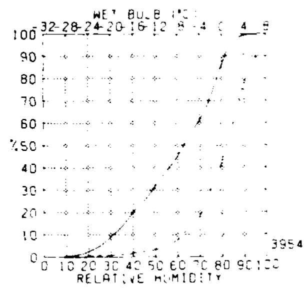
Cape Romanzof



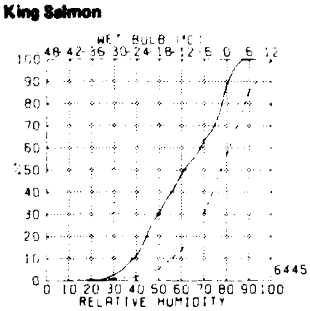
Bethel



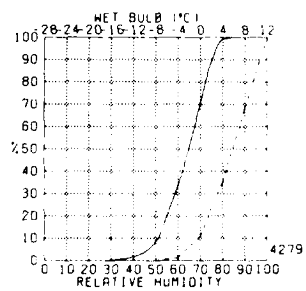
Cape Newenham



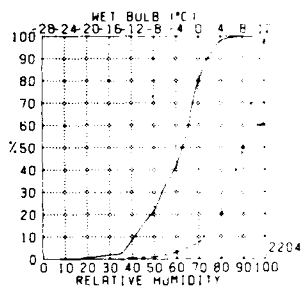
King Salmon



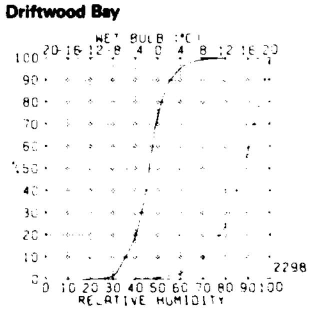
St. Paul

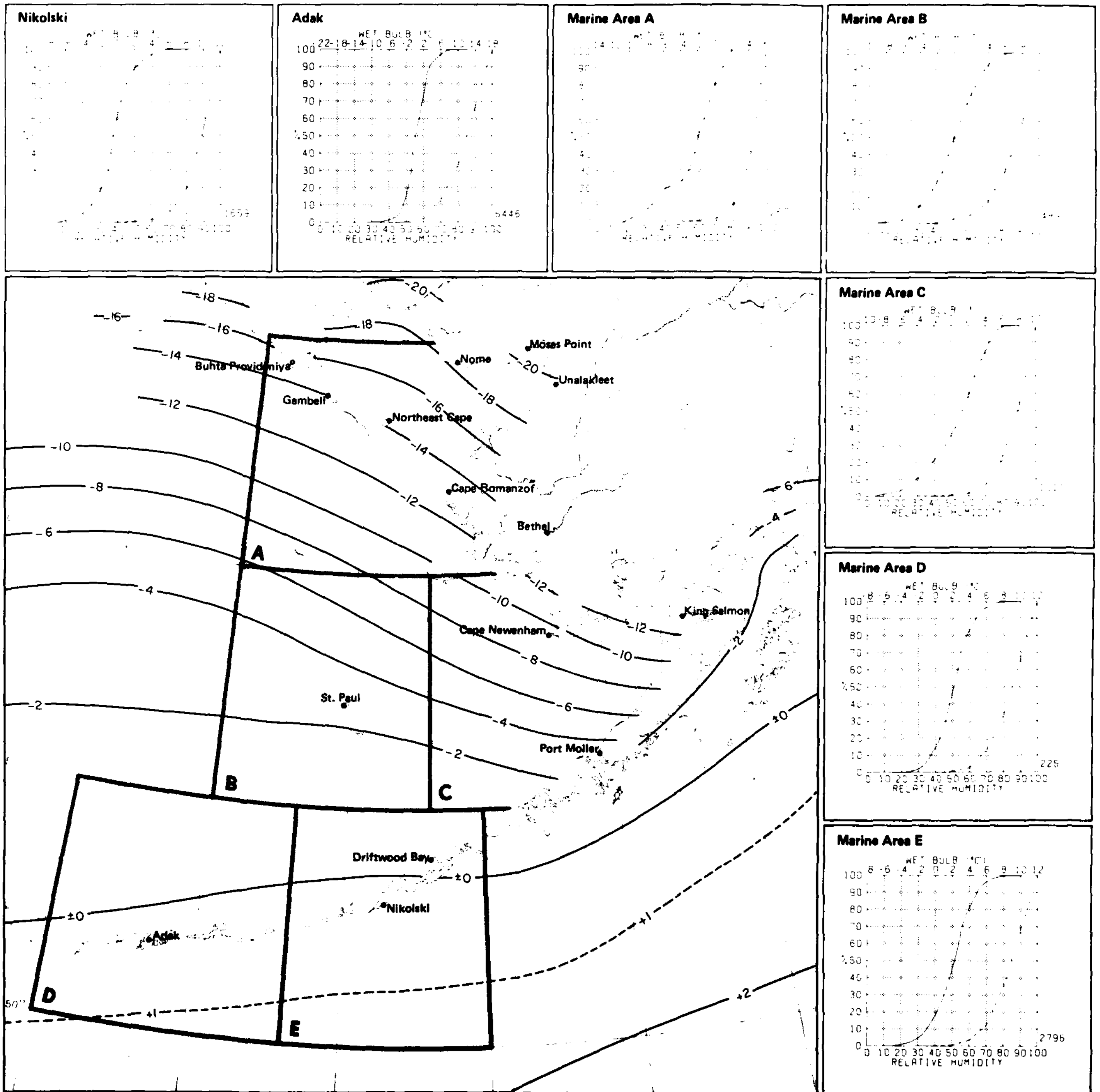


Port Moller



Driftwood Bay





4 Mean dew point temperature

December

Legend

Air temperature/wind speed

WIND SPEED (kts)

Percent frequency of simultaneous occurrence of specified temperature (°C) and wind speed (knots)

1% of all observations reported temperature 2,3°C simultaneously with wind speed of 22-33 kts

+ Indicates < 5% but > 0

Number of observations

3550

Map - Air temperature extremes (°C)

BLACK LINE Maximum 99% air temperature (1% of temperatures were greater than the given value)

BLUE LINE Minimum 1% air temperature (1% of temperatures were equal to or less than the given value)

The graph can be used to determine the extent of human discomfort from the combined effects of extreme heat or cold and winds or to estimate the likelihood of superstructure icing. Icing potential increases as the air temperature drops below freezing and the winds increase above 10 knots (12 mph) and may become quite severe with temperatures equal to or less than -9°C (16°F) and winds equal to or greater than 34 knots (39 mph).

Buhta Provideniya

[illegible]

Gambell

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
[illegible]	[illegible]	+	[illegible]	[illegible]	+
-2,-1	+	+	+	+	+
-4,-3	+	+	[illegible]	4	+
-6,-5	+	[illegible]	[illegible]	[illegible]	[illegible]
-8,-7	+	[illegible]	[illegible]	[illegible]	+
-10,-9	+	[illegible]	[illegible]	[illegible]	+
-12,-11	+	[illegible]	[illegible]	[illegible]	[illegible]
-14,-13	0	[illegible]	4	4	+
-16,-15	+	[illegible]	[illegible]	[illegible]	+
-18,-17	+	[illegible]	3	[illegible]	+
≤ -19	+	1	3	2	[illegible]

1239

Northeast Cape

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
≤ [illegible]	[illegible]	16	18	2	+

3220

Nome

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
2,3	0	+	+	+	0
0,1	0	1	2	+	+
-2,-1	+	2	3	1	+
-4,-3	+	2	3	1	+
-6,-5	1	1	2	1	+
-8,-7	1	2	3	1	+
-10,-9	1	2	2	+	+
-12,-11	2	3	2	1	+
-14,-13	2	4	3	1	+
-16,-15	1	3	2	1	+
≤ -17	19	18	5	1	+

7435

Moses Point

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

439[illegible]

Unalakleet

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
4,5	0	0	+	+	[illegible]
2,3	[illegible]	+	+	+	[illegible]
0,1	+	1	1	+	+
-2,-1	+	1	[illegible]	1	+
-4,-3	+	1	3	1	+
-6,-5	+	1	3	1	+
-8,-7	+	1	4	1	+
-10,-9	+	2	3	1	+
-12,-11	1	3	3	2	+
-14,-13	1	2	3	2	+
≤ -15	8	27	12	5	1

5586

Cape Romanzof

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
6,7	0	0	+	+	0
4,5	0	+	+	0	0
2,3	+	+	1	+	0
0,1	+	1	2	1	+
-2,-1	1	3	5	1	+
-4,-3	2	3	4	1	+
-6,-5	1	1	2	1	+
-8,-7	2	2	3	2	+
-10,-9	2	2	2	1	+
-12,-11	2	2	3	2	1
≤ -13	6	8	16	10	3

3246

Bethel

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
6,7	0	0	+	+	0
4,5	0	0	+	0	0
2,3	0	1	1	1	+
0,1	+	1	3	1	+
-2,-1	+	2	4	+	+
-4,-3	+	3	3	+	0
-6,-5	+	2	1	+	+
-8,-7	1	2	2	+	0
-10,-9	+	3	1	+	0
-12,-11	1	3	3	+	C
≤ -13	7	27	23	3	+

5847

Cape Newenham

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
6,7	0	+	+	+	+
4,5	0	+	1	1	+
2,3	1	3	5	2	+
0,1	1	3	6	1	+
-2,-1	2	4	4	1	+
-4,-3	3	3	2	1	+
-6,-5	2	2	+	1	+
-8,-7	3	3	2	1	+
-10,-9	2	2	2	+	+
-12,-11	2	1	2	+	+
≤ -13	9	8	10	2	+

3975

King Salmon

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
8,9	+	0	+	+	+
6,7	0	+	1	+	0
4,5	0	1	1	1	+
2,3	+	3	4	1	+
0,1	1	4	3	+	+
-2,-1	1	5	3	+	0
-4,-3	1	3	2	+	0
-6,-5	1	2	1	+	0
-8,-7	1	3	1	+	+
-10,-9	1	2	1	+	0
≤ -11	14	23	12	1	+

6445

St. Paul

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
6,7	0	0	0	+	+
4,5	0	+	1	2	+
2,3	+	3	12	6	1
0,1	+	4	7	5	1
-2,-1	+	4	8	4	1
-4,-3	1	4	8	4	1
-6,-5	+	2	5	2	1
-8,-7	+	2	3	3	+
-10,-9	+	+	1	1	+
-12,-11	+	+	+	1	+
≤ -13	+	0	+	1	+

4526

Port Moller

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
8,9	0	+	+	0	0
6,7	1	1	1	+	0
4,5	1	1	1	+	0
2,3	2	5	3	+	0
0,1	3	6	4	1	0
-2,-1	5	9	5	1	+
-4,-3	3	7	3	+	0
-6,-5	1	4	3	+	+
-8,-7	1	5	4	+	0
-10,-9	+	3	2	+	0
≤ -11	+	6	6	1	0

2204

Driftwood Bay

WIND SPEED (KTS)

TEMP (°C)	0-3	4-10	11-21	22-33	≥ 34
12,13	0	+	+	0	0
10,11	0	+	+	+	0
8,9	+	+	1	+	+
6,7	+	1	1	+	0
4,5	1	1	1	+	+
2,3	4	6	4	1	+
0,1	4	11	5	+	+
-2,-1	5	15	6	+	+
-4,-3	2	9	5	1	0
-6,-5	+	4	3	+	0
≤ -7	1	3	2	+	0

2451

Nikolski

2184

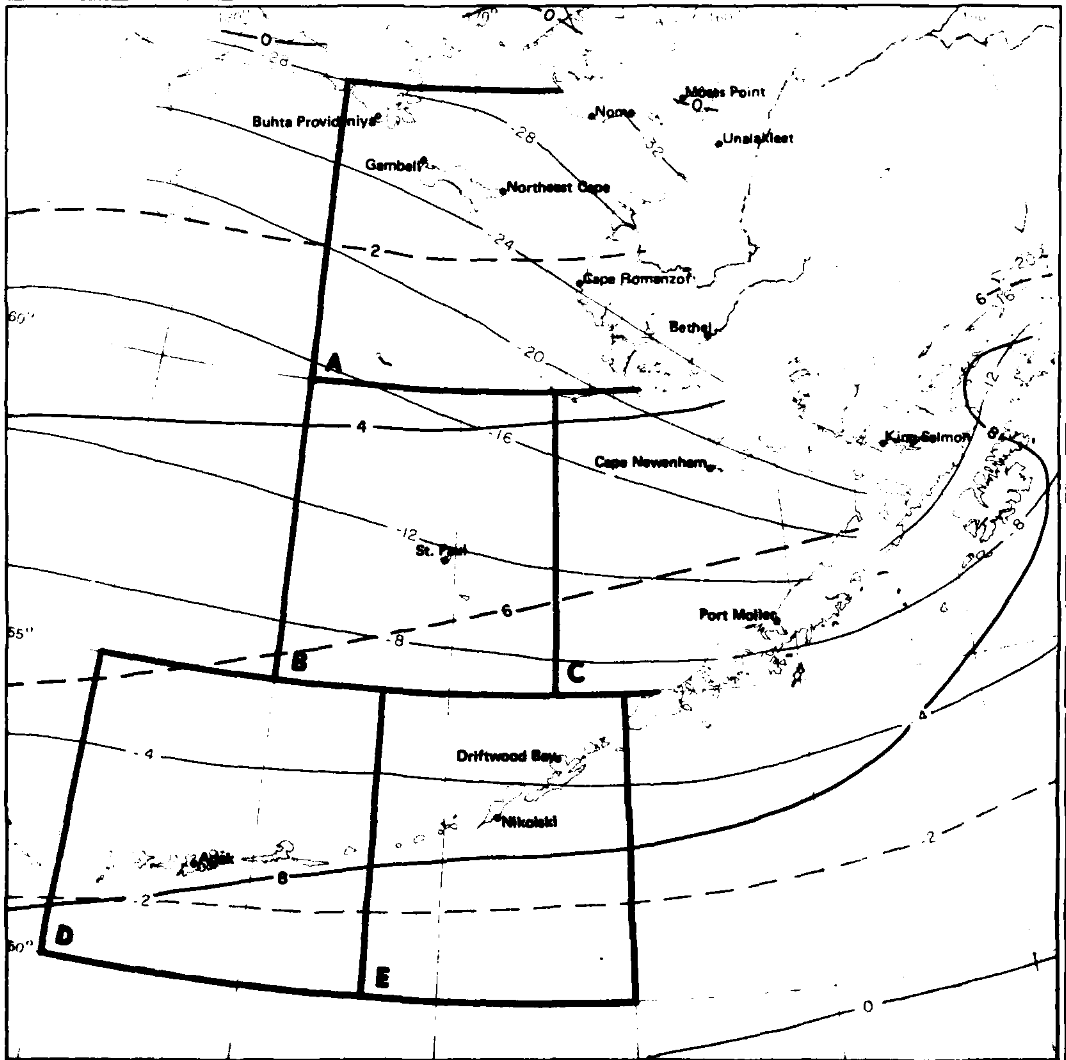
Adak

TEMP					
[illegible]	0	1	0	1	·
[illegible]	0	0	·	·	·
8.9	0	·	·	·	·
[illegible]	·	1	2	1	·
4.5	1	4	5	2	1
[illegible]	4	10	13	5	1
[illegible]	4	8	10	4	1
[illegible]	4	5	1	2	·
4.3	2	1	1	·	·
6.[illegible]	1	·	0	0	0
[illegible]	1	·	0	0	0

6438

Marine Area A

Marine Area B



Marine Area C

Marine Area D

2858

Marine Area E

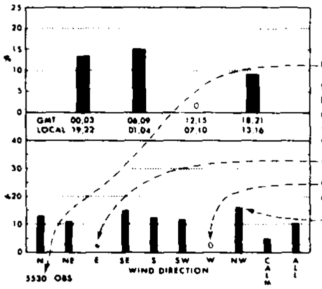
4249

5 Air temperature extremes (°C)

December

Legend

Fog/time and fog/wind direction



- Number of observations
- Bar graphs represent percent frequency of Fog (without precipitation) for various hour groupings and wind directions. Data are based on 100% for each hour group and direction category
- * indicates < 05% but >0
- 0 indicates no fog occurred with the wind direction
- *(Data show that 17% of all NW winds were accompanied by Fog (without precipitation).)*

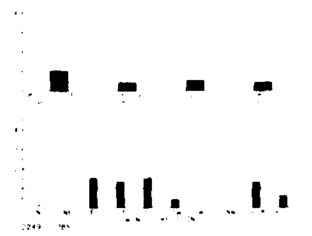
Map - Fog

BLACK LINE Percent frequency of occurrence of all fog

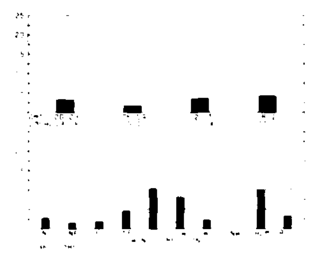
BLUE LINE Percent frequency of fog occurring without precipitation

The percent frequency of observations reporting fog with precipitation for a given point can be determined by computing the difference between the two analyses

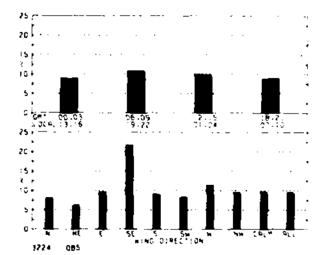
Buhta Provideniya



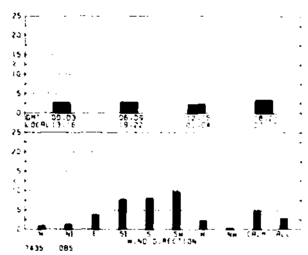
Gambell



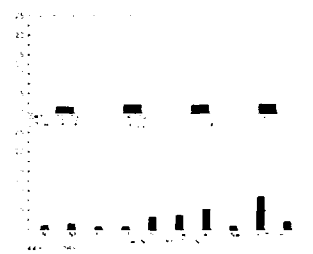
Northeast Cape



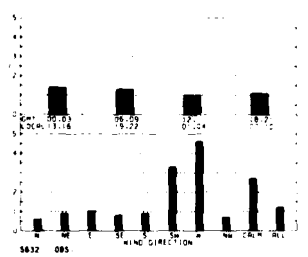
Nome



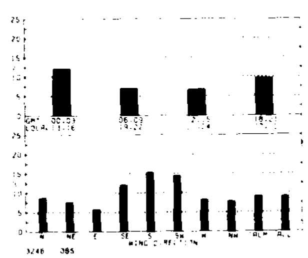
Moses Point



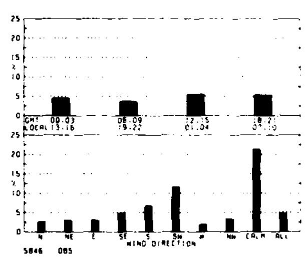
Unalakleet



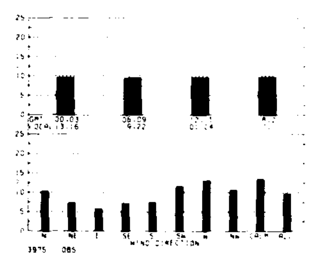
Cape Romanzof



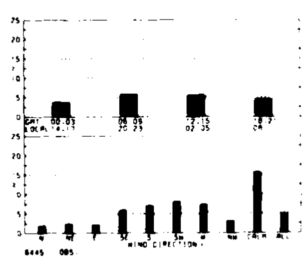
Bethel



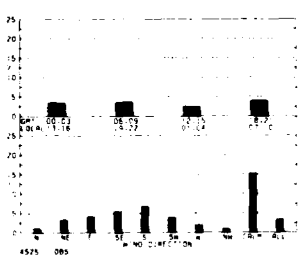
Cape Newenham



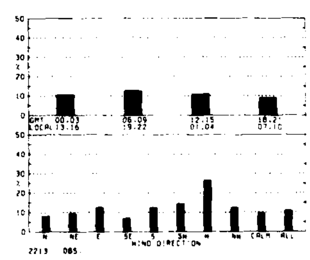
King Salmon



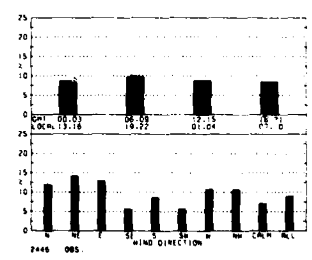
St. Paul

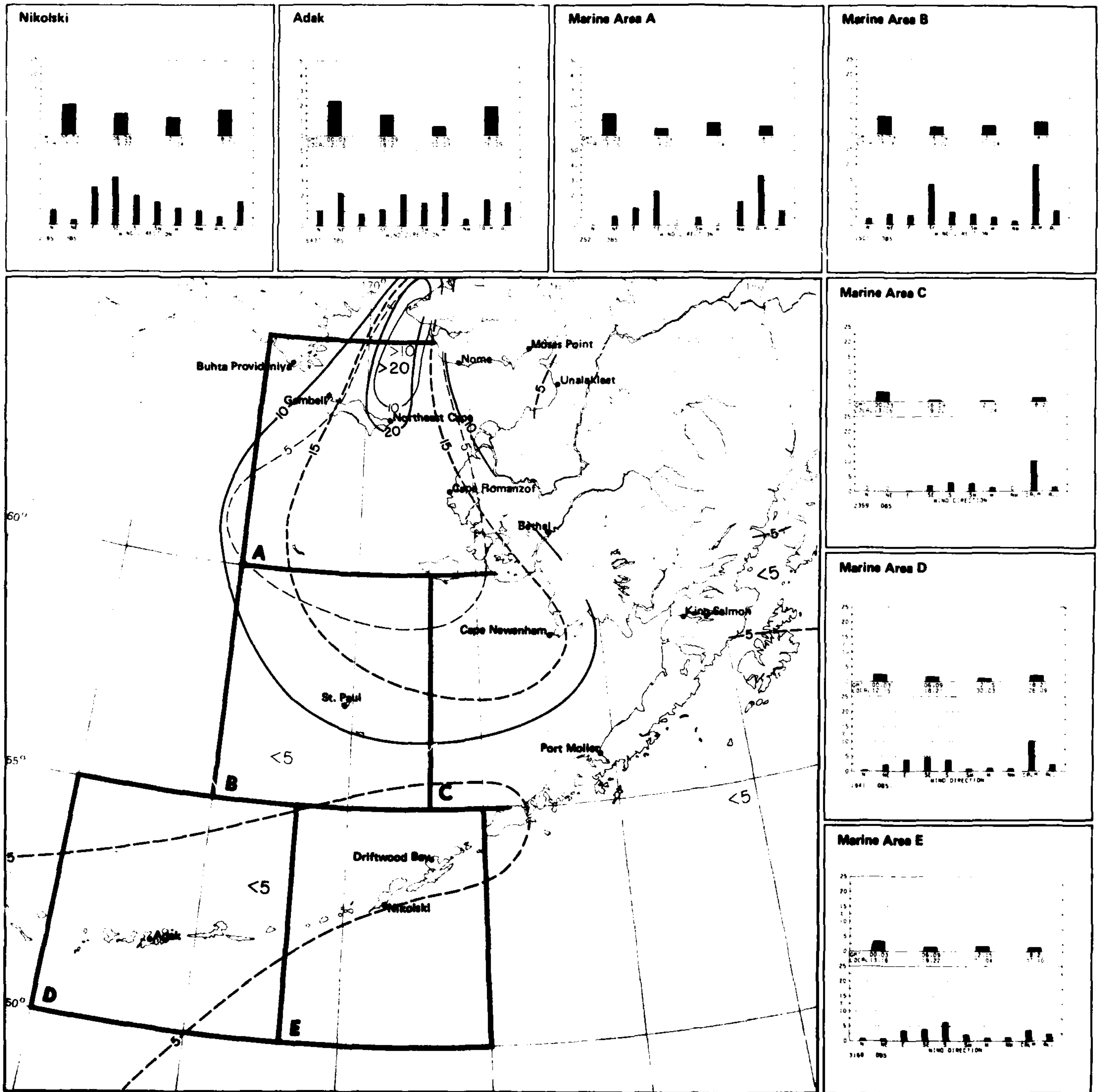


Port Moller



Driftwood Bay



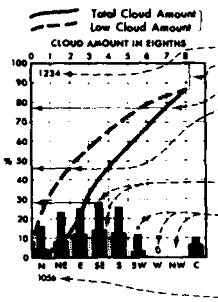


6 Fog

December

Legend

Cloud cover/wind direction



Total Cloud Amount / Low Cloud Amount: Cumulative percent frequency of indicated cloud amount equal to or less than the amount intersected by the curve.

— Number of total cloud observations

— Obscurations

— (77% of all total cloud amounts were ≤7/8.)

— (46% of all low cloud amounts were ≤2/8.)

≥5/8 (5/8 & 6/8, ≥7/8) Low cloud amount: Percent frequency of observations from each direction and calm that were accompanied by low cloud amounts ≥5/8 and ≥7/8. Low clouds are clouds with bases <8000 feet.

— (28% of all SE winds were accompanied by low cloud amounts ≥5/8 and 14% by low cloud amounts ≥7/8.)

— An asterisk indicates that the percentage is based on 10-30 observations of wind direction, total and low cloud amount. 0 replaces bar graph when no low cloud amounts ≥5/8 were observed with a wind direction or calm. 0 or bar is omitted when number of observations of total and low cloud amount from a wind direction or calm is less than 10

— Number of low cloud observations

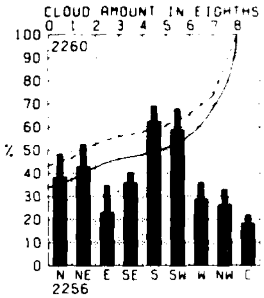
Map - Cloud amount thresholds

BLACK LINE Percent frequency of total cloud amount ≤2/8

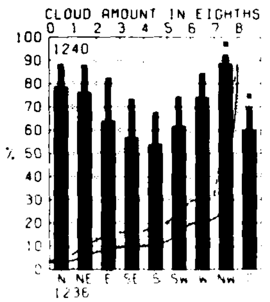
BLUE LINE Percent frequency of low cloud amount ≥5/8

Since the number of observations reporting low cloud amount is usually less than that for total cloud amount, somewhat different samples may be used to compute the two curves on the graph. This may lead to inconsistencies where low cloud amount appears higher than the total cloud amount. Where this occurred the graph was adjusted in favor of the total cloud by making the curves coincide. The frequency of obscured conditions may be determined by subtracting the cumulative percent frequency corresponding to 8/8 coverage from 100%. In computing the bar graph, obscurations are considered as 8/8 coverage.

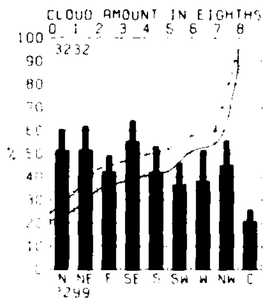
Buhta Providenya



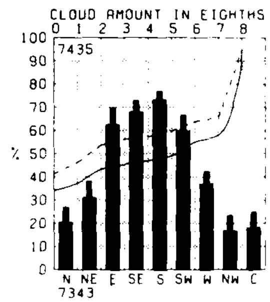
Gambell



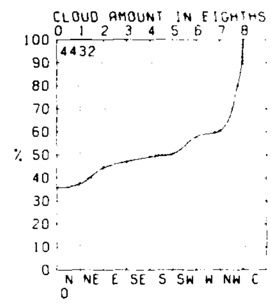
Northeast Cape



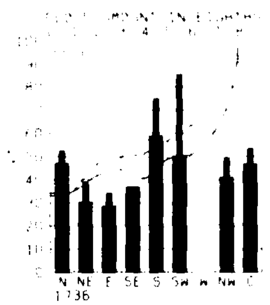
Nome



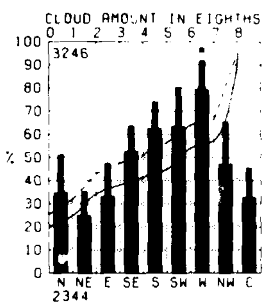
Moses Point



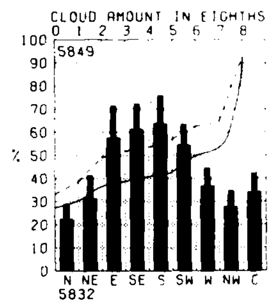
Unalakleet



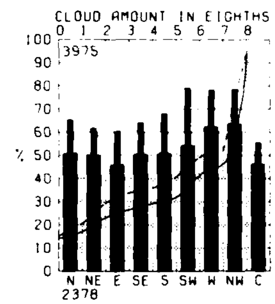
Cape Romanzof



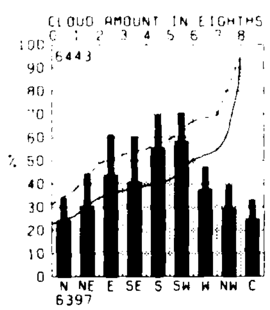
Bethel



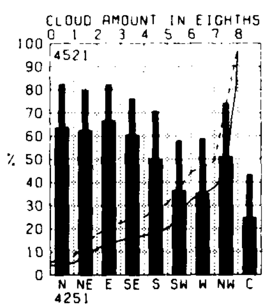
Cape Newenham



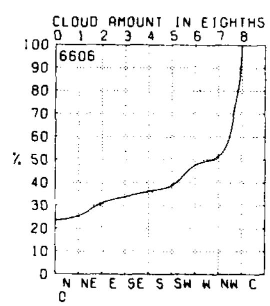
King Salmon



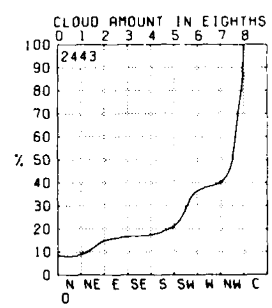
St. Paul

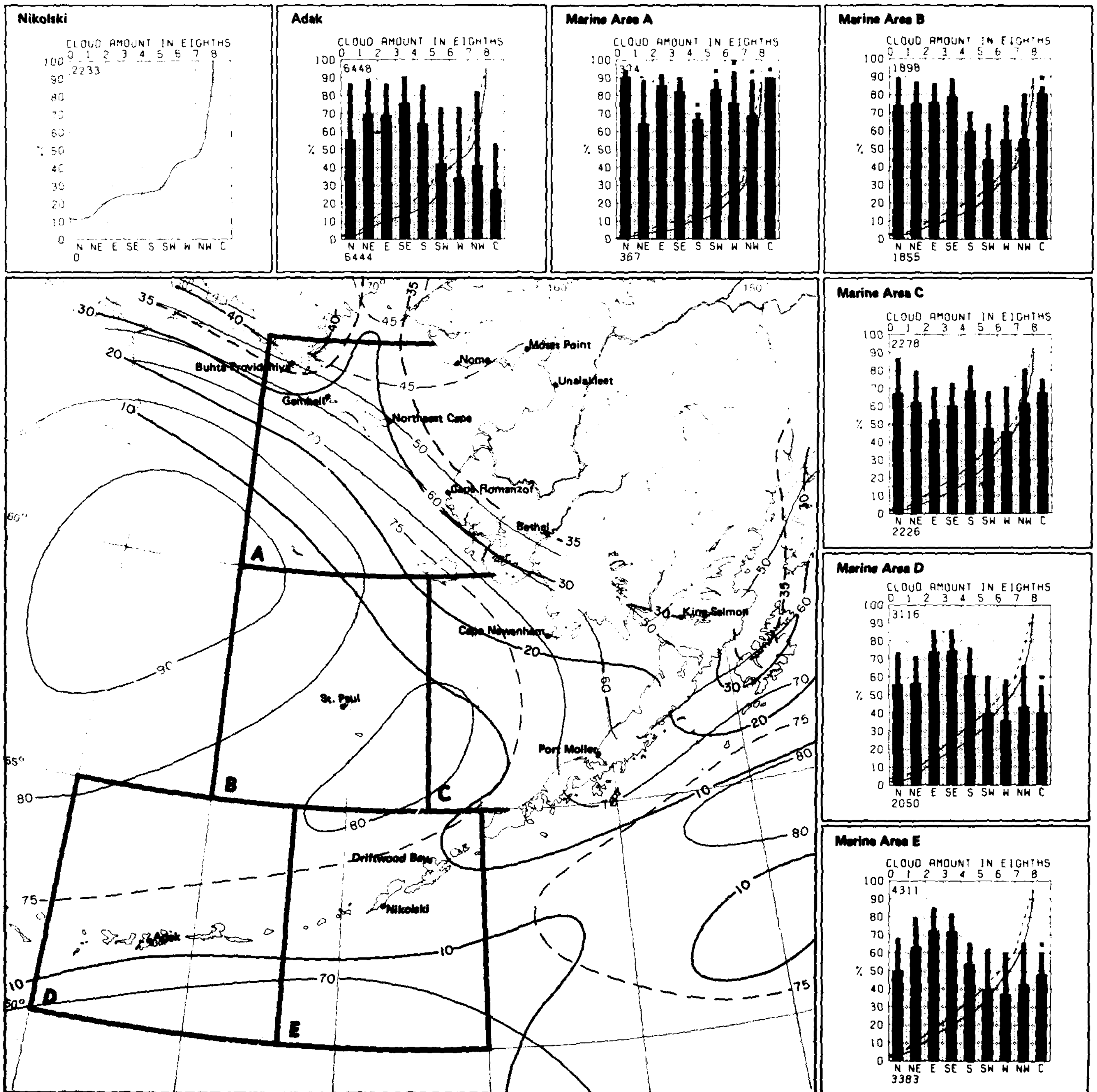


Port Moller



Driftwood Bay

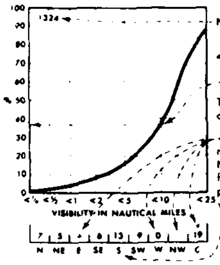




7 Cloud amount thresholds **December**

Legend

Visibility/wind direction



Number of observations

Cumulative percent frequency of visibilities less than the visibility intersected by the curve

(37% of all visibilities reported were <10 nautical miles)

The table below the graph indicates percent frequency of occurrence of visibility <2 nautical miles versus wind direction

• indicates < 5% but >0   0 indicates that no visibilities <2 nautical miles were observed with winds from a direction or calm. No percentage is given if less than 10 observations were available for visibility and wind direction. An asterisk indicates that the percentage was based on 10-30 observations of visibility and wind direction

(13% of all S winds were accompanied by visibilities <2 nautical miles)

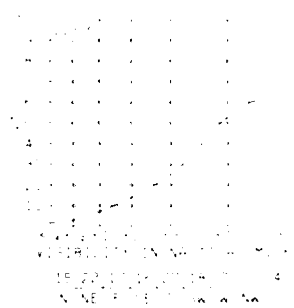
Map - Visibility thresholds

BLACK LINE   Percent frequency of visibilities ≥5 nautical miles

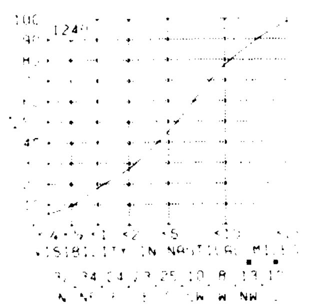
BLUE LINE   Percent frequency of visibilities <2 nautical miles

The percentage of visibility equal to or greater than a given value can be obtained from the graph by subtracting the cumulative percent frequency of that value from 100%. Visibility at sea is difficult to measure because of the lack of reference points. Also, some observers seem to report reduced visibilities at night because of darkness, though this tendency has abated in recent years. The coarseness of the coding intervals, however, tends to minimize serious biases in the summarized data. Visibilities greater than 25 nmi should be interpreted cautiously because the earth's curvature makes it impossible to see 25 nmi horizontally from the bridges of most ships.

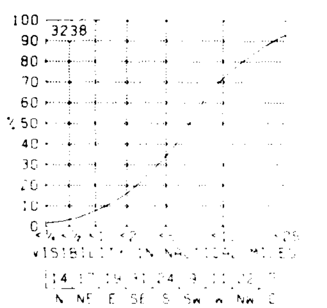
Buhta Providenіya



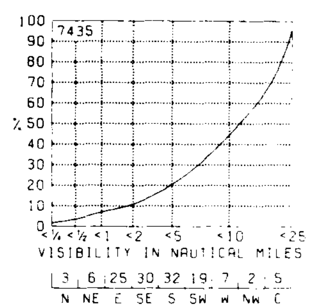
Gambell



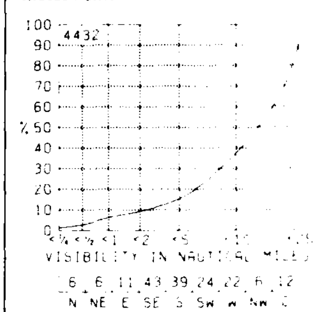
Northeast Cape



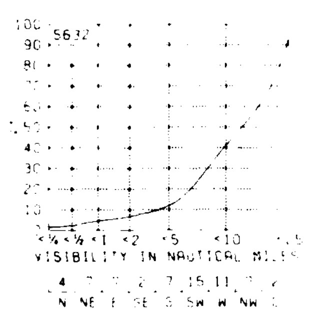
Nome



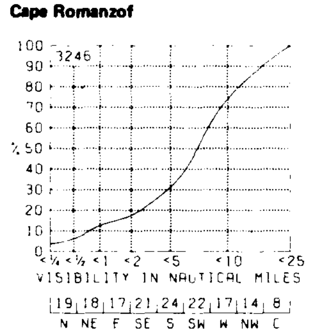
Moses Point



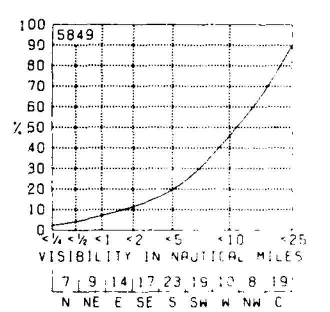
Unalakleet



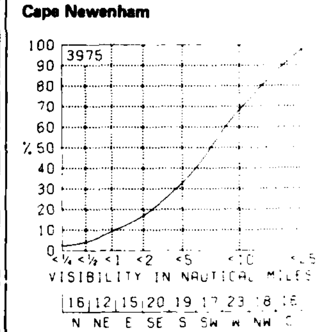
Cape Romanzof



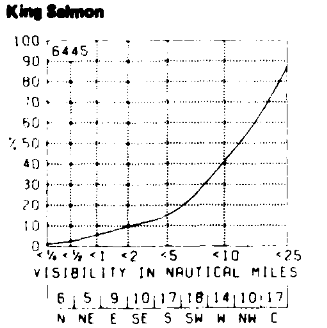
Bethel



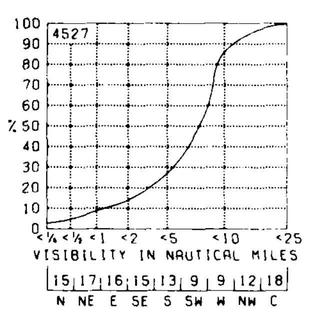
Cape Newenham



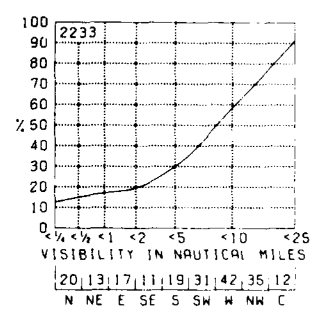
King Salmon



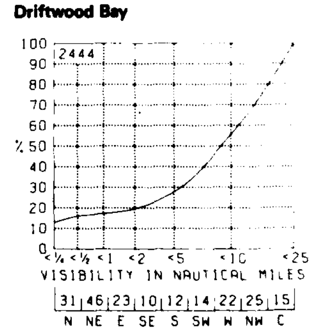
St. Paul

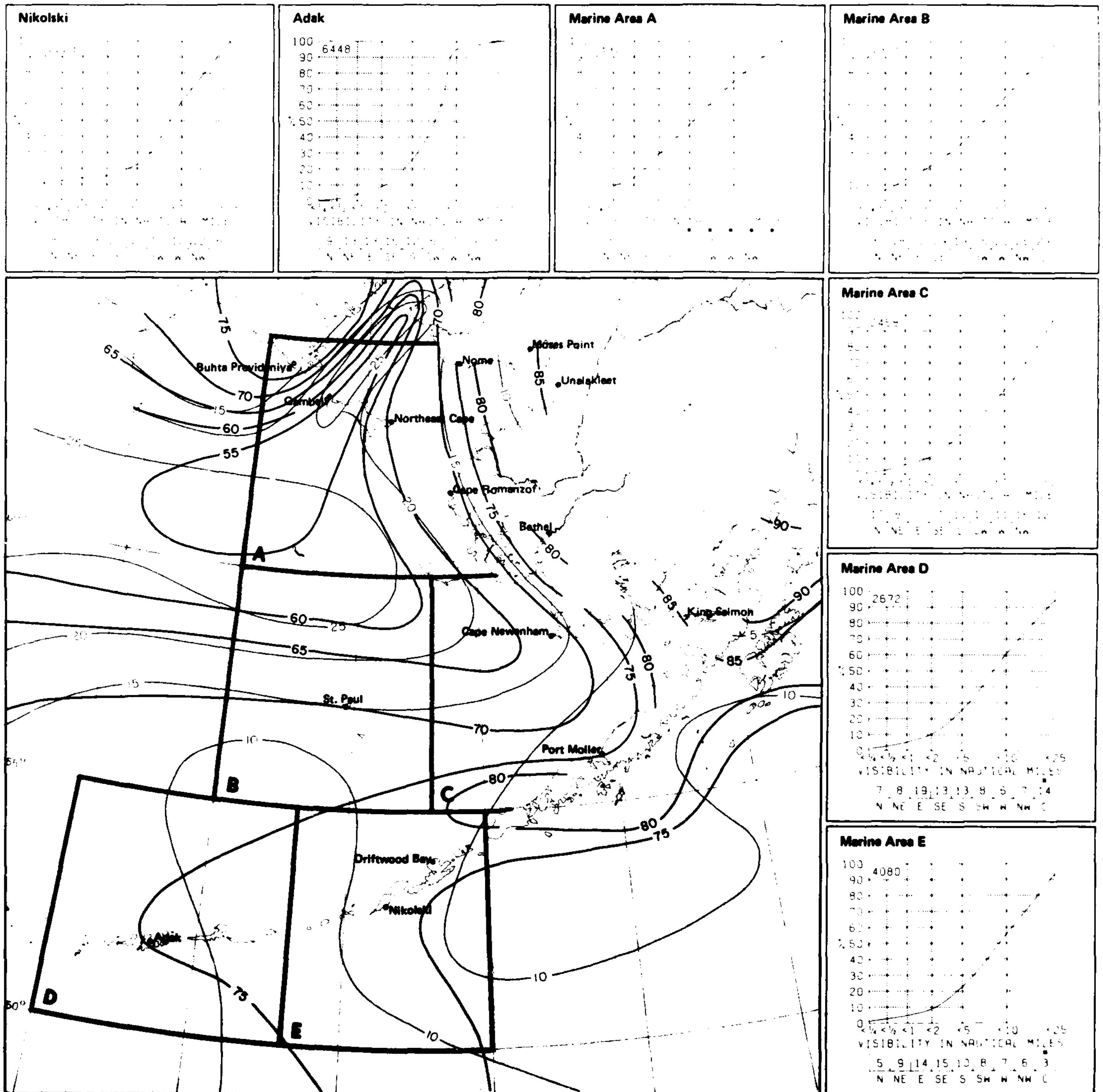


Port Moller



Driftwood Bay





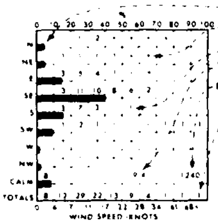
8 Visibility thresholds

December

Legend

Wind speed/direction

Direction frequency (top scale): Bars represent percent frequency of winds observed from each direction. Speed frequency (bottom scale): Printed figures represent percent frequency of wind speeds observed from each direction.



(4% of all winds were from the N)

· indicates < 5% but >0

(1% of all winds were from the S with a speed 22-27 knots)

The scalar mean speed was 9.4 knots

Number of observations

(1% of winds from all directions had wind speed ≥48 knots)

WIND SPEED INTERVAL (KNOTS)

0-3	4-6	7-10	11-16	17-21	22-27	28-33	34-40	41-47	≥48
0	4	7	11	17	22	28	34	41	48+

Printed scale on bottom of chart

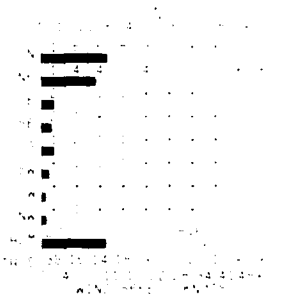
Map · Wind speed thresholds

BLACK LINE · Percent frequency of wind speed ≤10 knots (≤12 mph)

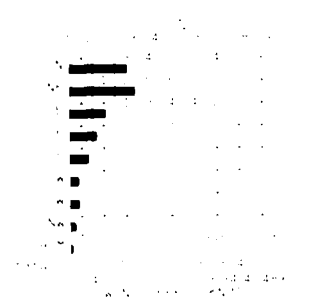
BLUE LINE · Percent frequency of wind speed ≥34 knots (≥39 mph)

The scalar mean wind speed on the graph is based on the number of observations reporting a wind speed with direction. The sum of the totals line provides the cumulative percent frequency of wind speed below a selected threshold value. In the example graph, 71% of all winds were less than 17 knots (20 mph).

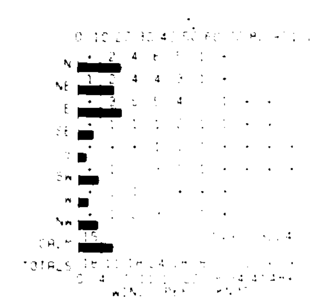
Buhta Provideniya



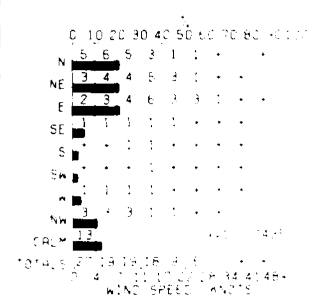
Gambell



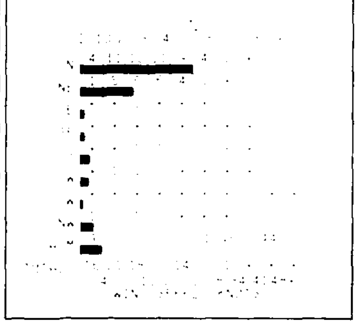
Northeast Cape



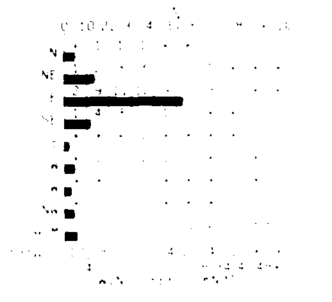
Nome



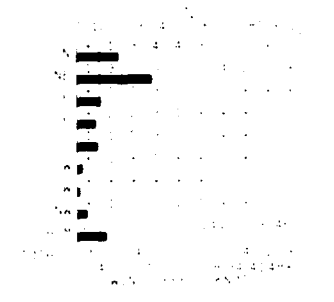
Moses Point



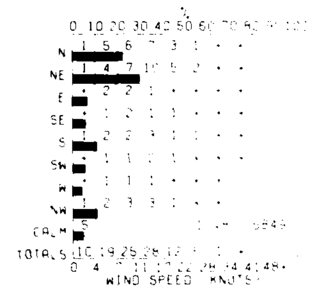
Unalakleet



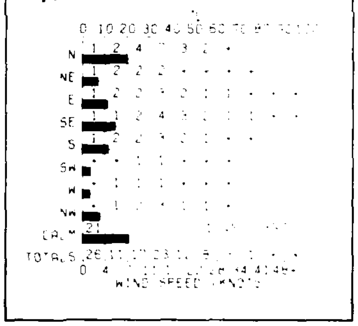
Cape Romanzof



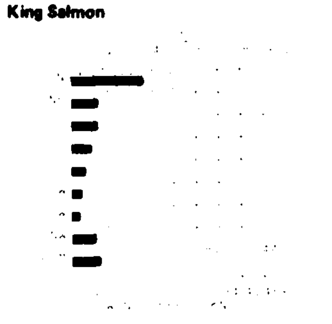
Bethel



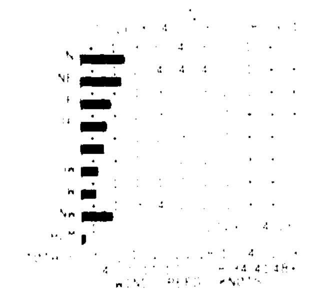
Cape Newenham



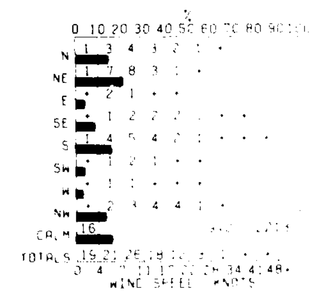
King Salmon



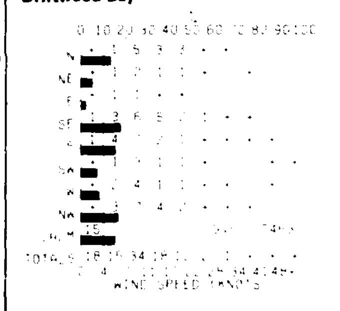
St. Paul

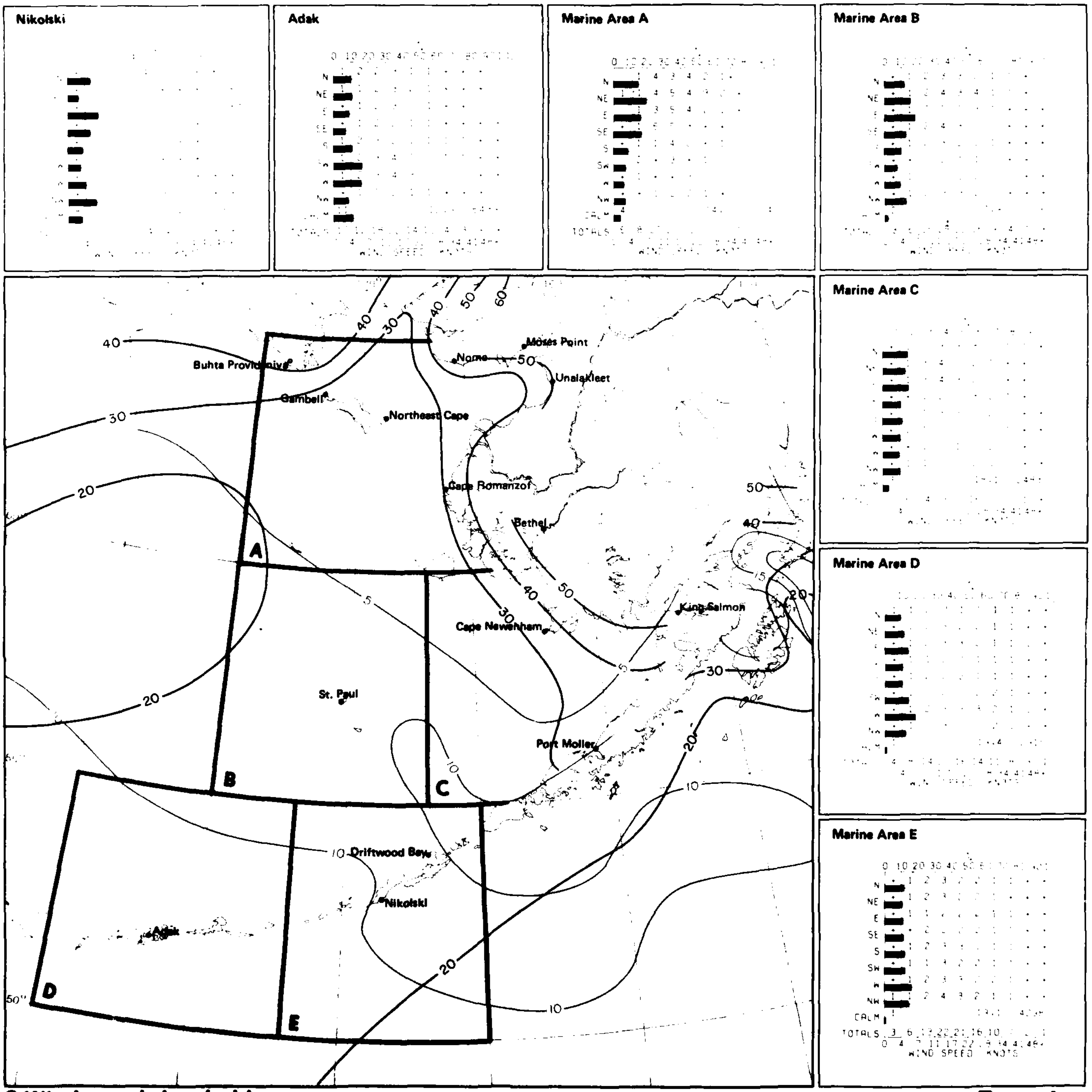


Port Moller



Driftwood Bay

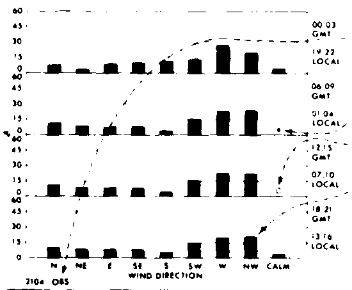




9 Wind speed thresholds **December**

Legend

Wind direction/diurnal variation



Number of observations

Bars show percent frequency of wind direction (8 pts.) by hour (GMT and Local Time). Data are based on 100% for each hour group

* indicates < 05% but >0

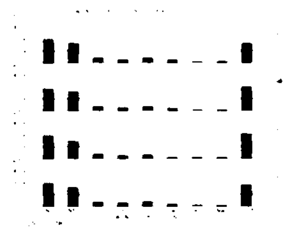
0 indicates no observations in the category

(22% of the wind observations for the hours 18 and 21 GMT (13 and 16 Local Time) had a direction from the northwest.)

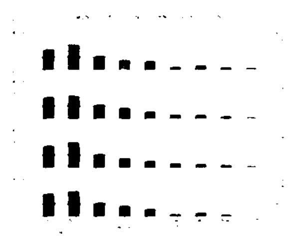
Map - Vector mean wind

10.2 Direction of flow toward station dot, vector magnitude in knots example: vector mean wind is from northeast at 10.2 knots or 11.7 mph)

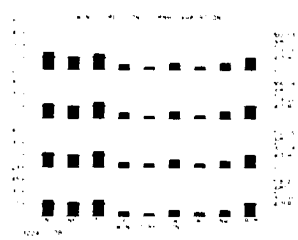
Buhta Provideniya



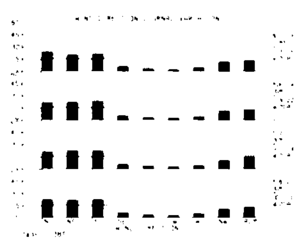
Gambell



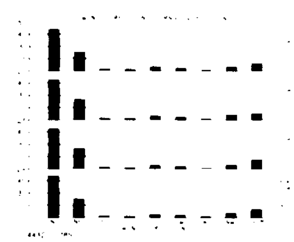
Northeast Cape



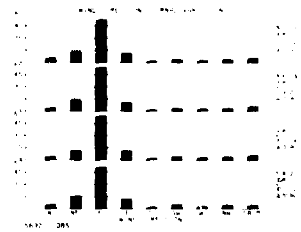
Nome



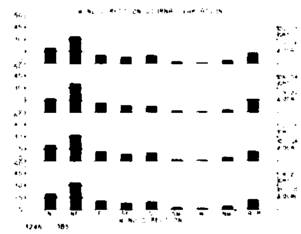
Moses Point



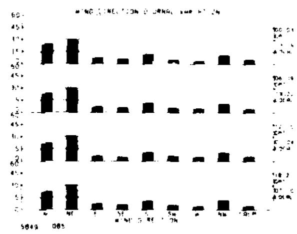
Unalakleet



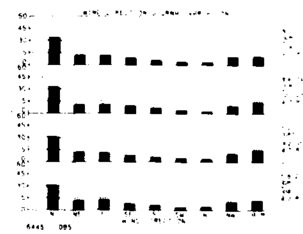
Cape Romanzof



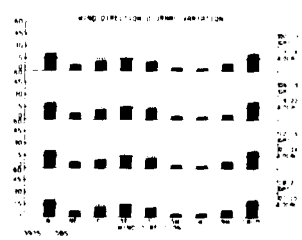
Bethel



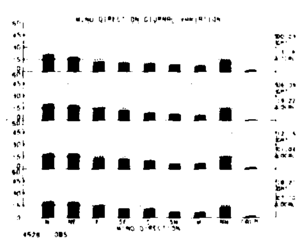
Cape Newenham



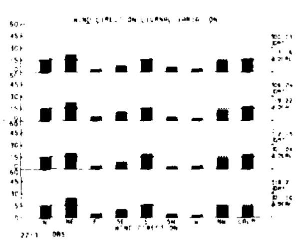
King Salmon



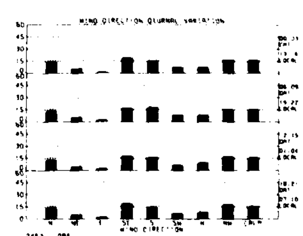
St. Paul

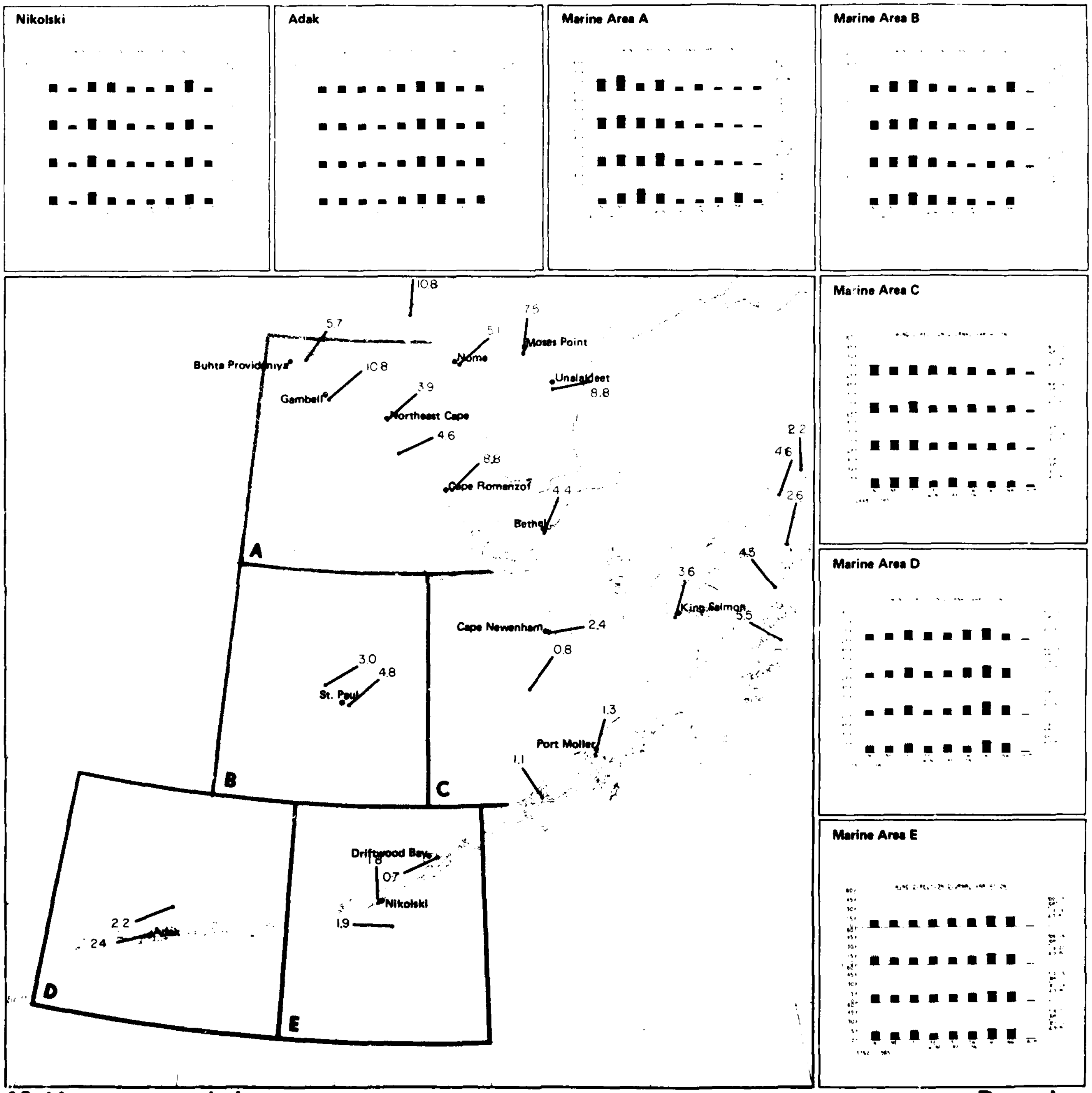


Port Moller



Driftwood Bay

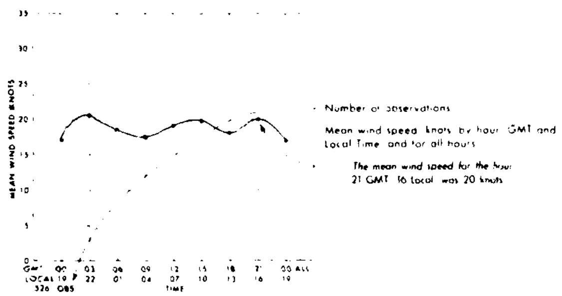




10 Vector mean wind

December

Legend **Wind speed/diurnal variation**



Map · Scalar mean wind

BLACK LINE Scalar mean wind knots

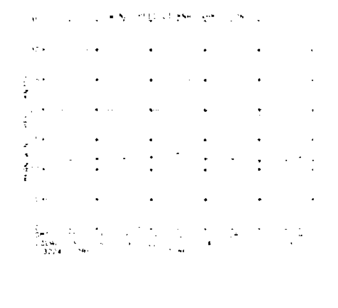
In areas of high persistence of direction the magnitude of the vector mean winds should closely approach that of the scalar mean winds. As most of the marine observations are recorded at six hour intervals disregard the plots for other than 00 06 12 18 GMT hours on the marine area graphs

Buhta Provideniya

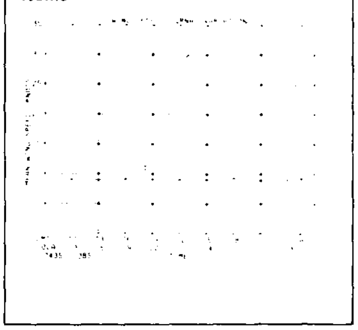
Insufficient Data

Gambell

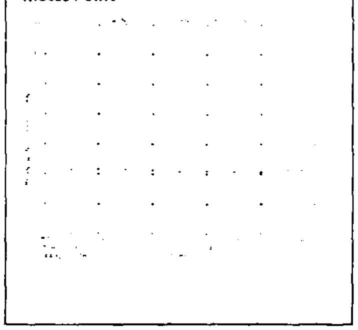
Northeast Cape



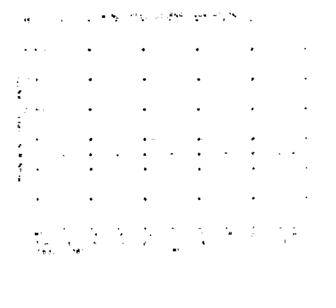
Nome



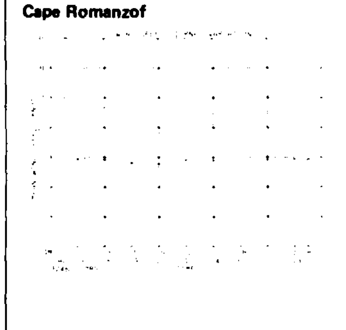
Moses Point



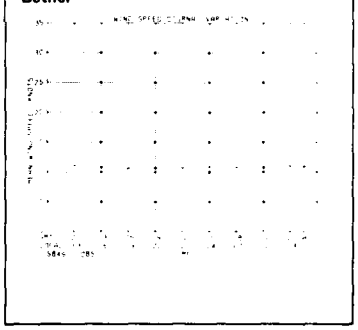
Unalakleet



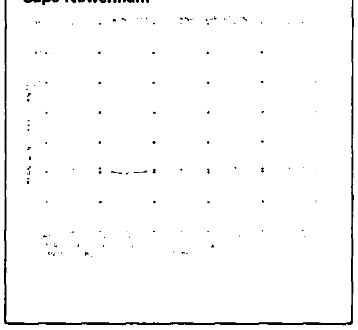
Cape Romanzof



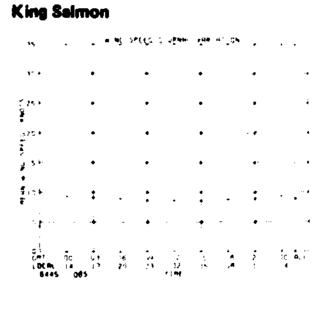
Bethel



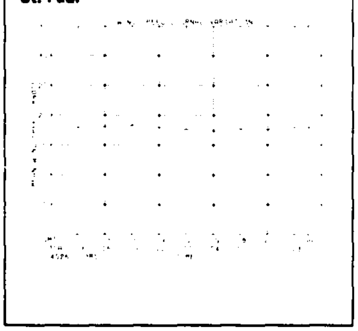
Cape Newenham



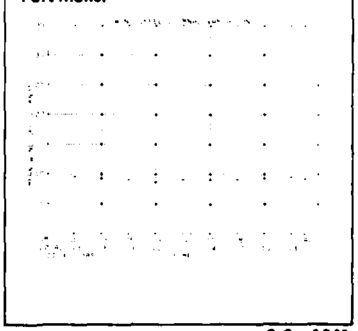
King Salmon



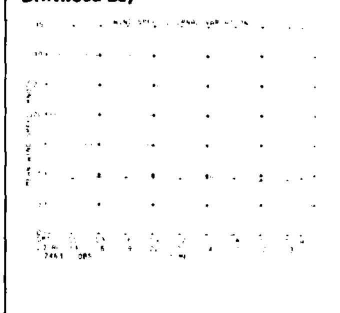
St. Paul

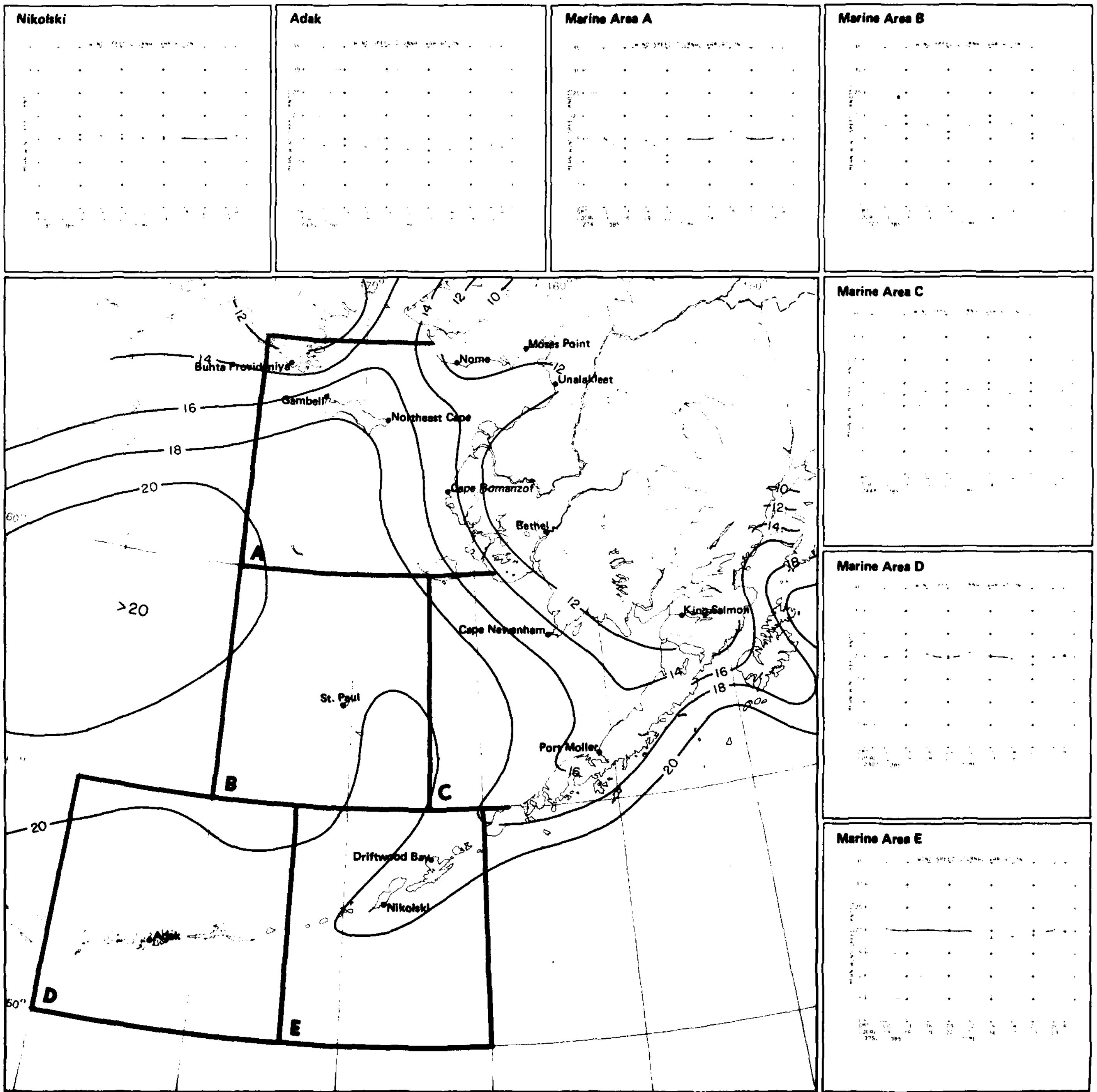


Port Moller



Driftwood Bay





11 Scalar mean wind **December**

Legend

Low cloud ceiling/visibility

Percent frequency of simultaneous occurrence of specified low cloud ceilings (hundreds of feet) and visibilities (nautical miles)

Low cloud ceiling heights are estimated from the height of low clouds (h) when low cloud amount (N_h) is ≥5/8

Obscurations are included under ceiling 0<1.5

N C (no ceiling) includes bases of clouds ≥8000 feet as well as occurrences of N_h <5/8

2% of all observations reported ceiling ≥1000 but <2000 feet simultaneously with visibility ≥5 but <10 nautical miles

• indicates < 5% but >0

334 Number of observations

Map - Low cloud ceiling and visibility thresholds

BLACK LINE Percent frequency of low cloud ceiling ≥1000 feet (or no low cloud ceiling) and visibility ≥5 nautical miles

BLUE LINE Percent frequency of low cloud ceiling <600 feet and or visibility <2 nautical miles

Buhta Provideniya

Gambell

LOW CLOUD CEILING	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
50<80	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
35<50	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
20<35	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
10<20	[illegible]	[illegible]	4	•	14	[illegible]
6<10	[illegible]	[illegible]	[illegible]	[illegible]	4	1
3<6	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1.5<3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
0<1.5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0

1236

Northeast Cape

LOW CLOUD CEILING	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	•	•	•	3	14	31
50<80	•	0	0	0	•	•
35<50	0	•	•	0	•	•
20<35	0	•	•	2	5	1
10<20	•	1	4	8	11	3
6<10	•	•	1	3	2	•
3<6	•	•	•	•	•	•
1.5<3	0	0	0	•	•	0
0<1.5	3	2	2	•	0	0

2299

Nome

LOW CLOUD CEILING	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	•	•	•	1	11	48
50<80	•	•	•	•	1	2
35<50	0	•	•	•	2	1
20<35	•	•	•	2	4	2
10<20	•	•	1	3	4	2
6<10	•	•	1	2	2	•
3<6	•	•	1	1	•	•
1.5<3	•	•	•	•	•	0
0<1.5	2	2	1	•	•	0

7343

Moses Point

LOW CLOUD CEILING	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	•	0	•	[illegible]	14	[illegible]
50<80	0	0	[illegible]	[illegible]	[illegible]	[illegible]
35<50	0	0	[illegible]	[illegible]	[illegible]	[illegible]
20<35	0	0	•	4	[illegible]	[illegible]
10<20	0	0	[illegible]	5	6	2
6<10	0	0	2	1	0	0
3<6	•	•	0	0	0	0
1.5<3	0	0	0	0	0	0
0<1.5	10	5	3	1	0	0

247

Unalakleet

Cape Romanzof

LOW CLOUD CEILING	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	1	1	1	5	25	18
50<80	•	•	•	•	1	1
35<50	•	•	•	•	1	1
20<35	•	•	•	2	6	1
10<20	1	1	1	4	9	1
6<10	•	1	1	3	3	•
3<6	•	•	1	1	1	0
1.5<3	0	0	0	0	0	0
0<1.5	3	2	1	•	0	0

2344

Bethel

LOW CLOUD CEILING	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	1	•	1	1	13	42
50<80	•	0	•	•	1	3
35<50	•	0	•	•	1	2
20<35	•	•	•	1	4	3
10<20	•	•	1	2	4	2
6<10	•	•	1	2	2	1
3<6	•	•	1	1	1	•
1.5<3	•	•	•	•	•	0
0<1.5	3	2	2	1	•	0

5832

Cape Newenham

LOW CLOUD CEILING	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	•	•	1	1	15	20
50<80	•	0	0	•	•	1
35<50	0	0	•	•	1	1
20<35	•	•	•	1	4	2
10<20	•	1	1	5	10	4
6<10	•	1	2	6	7	2
3<6	•	•	1	2	1	•
1.5<3	0	0	•	•	0	0
0<1.5	3	3	2	1	0	0

2378

King Salmon

LOW CLOUD CEILING	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	1	1	1	1	12	46
50<80	•	•	•	•	2	3
35<50	0	•	•	•	2	3
20<35	•	•	•	1	4	4
10<20	•	•	1	1	3	2
6<10	•	•	•	1	2	1
3<6	•	•	•	1	1	1
1.5<3	0	•	•	•	•	•
0<1.5	1	2	2	1	•	•

6397

St. Paul

LOW CLOUD CEILING	<1/2	1/2<1	1<2	2<5	5<10	≥10
NC	•	•	•	1	18	6
50<80	0	0	•	0	1	•
35<50	•	•	•	•	2	2
20<35	1	1	1	2	16	4
10<20	1	1	1	6	19	2
6<10	•	•	1	3	3	•
3<6	•	1	1	2	1	0
1.5<3	•	•	•	•	0	0
0<1.5	2	1	•	•	0	0

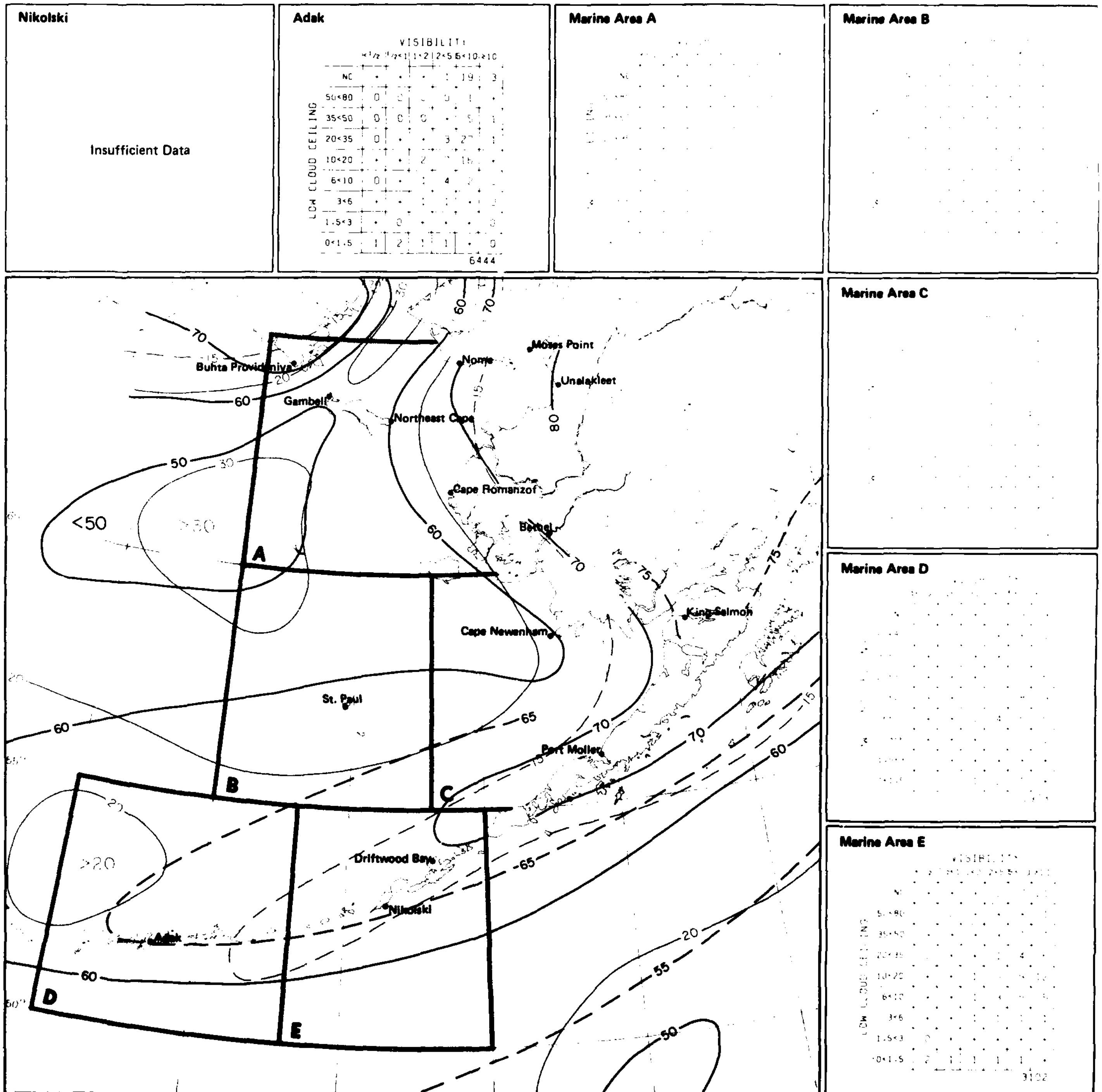
4251

Port Moller

Insufficient Data

Driftwood Bay

Insufficient Data

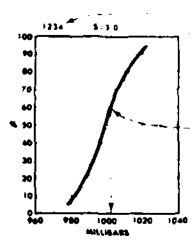


12 Low cloud ceiling and visibility thresholds

December

Legend

Sea level pressure



Number of observations

Cumulative percent frequency of sea level pressures equal to or less than the pressure intersected by the curve

S Standard deviation of pressure (mbs)

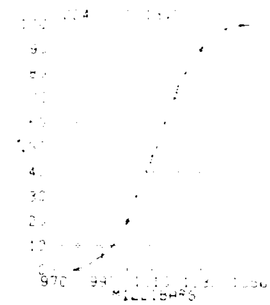
(60% of all observed sea level pressures were ≤1002 millibars)

Map - Mean sea level pressure

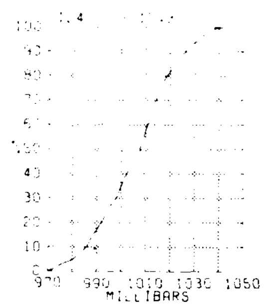
BLACK LINE Mean sea level pressure (millibars)

Sea level pressure is one of the most frequently recorded elements but one of the least accurate because of instrument and coding errors. Despite the inaccuracies of the individual readings, however, the large-scale patterns and mean gradients of the isopleth analyses are relatively accurate.

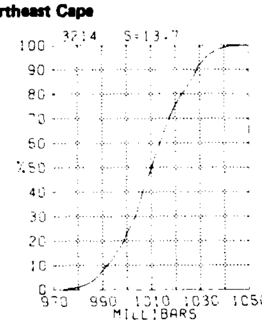
Buhta Providenya



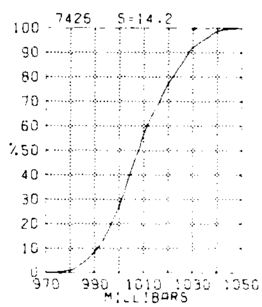
Gambell



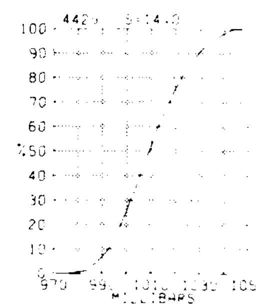
Northeast Cape



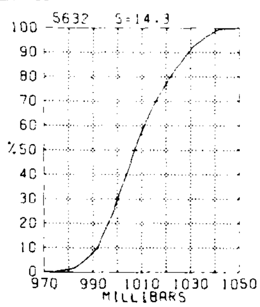
Nome



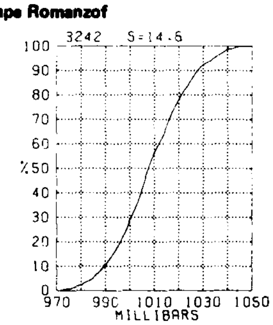
Moses Point



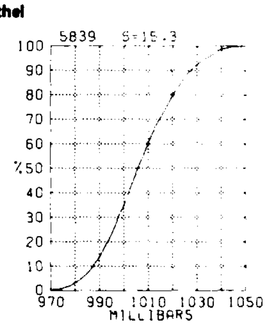
Unalakleet



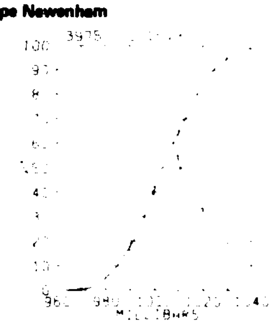
Cape Romanzof



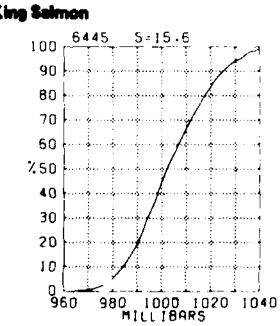
Bethel



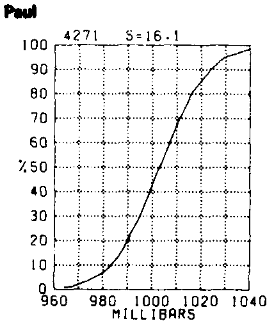
Cape Newenham



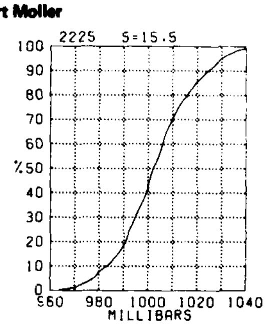
King Salmon



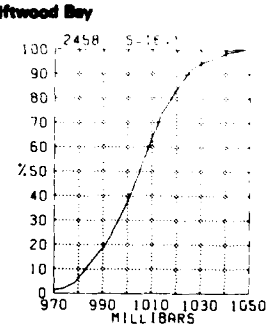
St. Paul

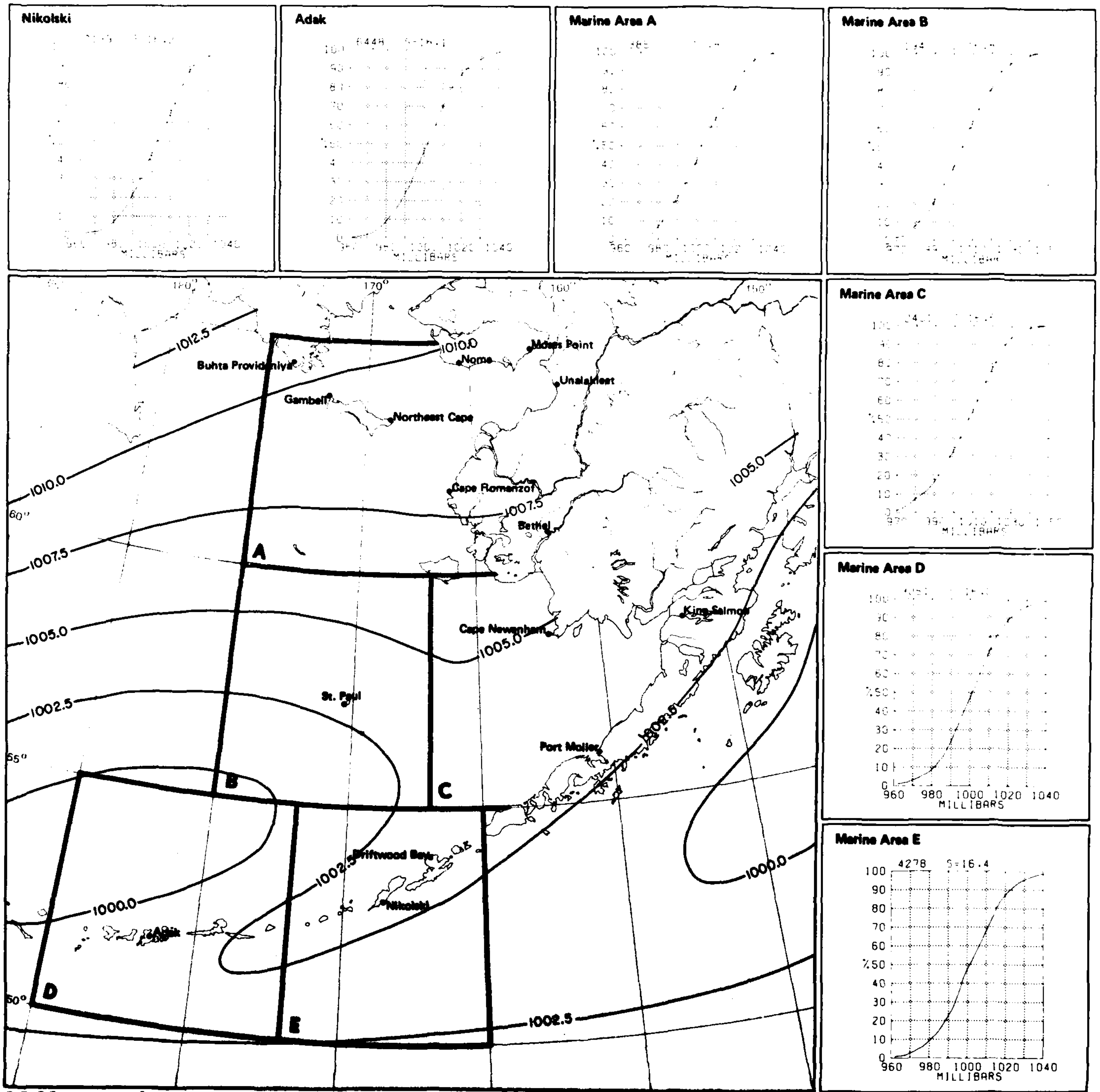


Port Moller



Driftwood Bay



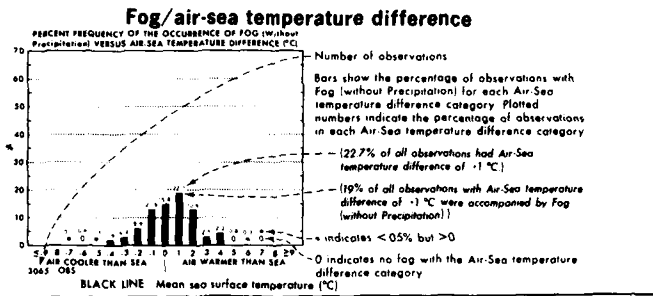


13 Mean sea level pressure

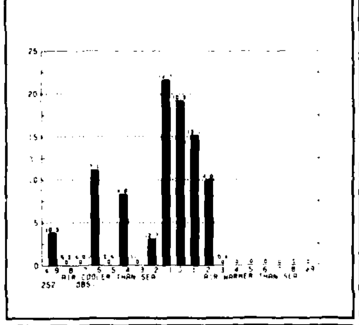
December

Legend

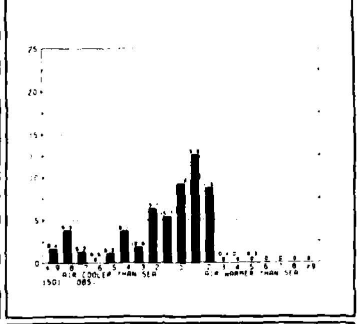
Fog/air-sea temperature difference



Marine Area A

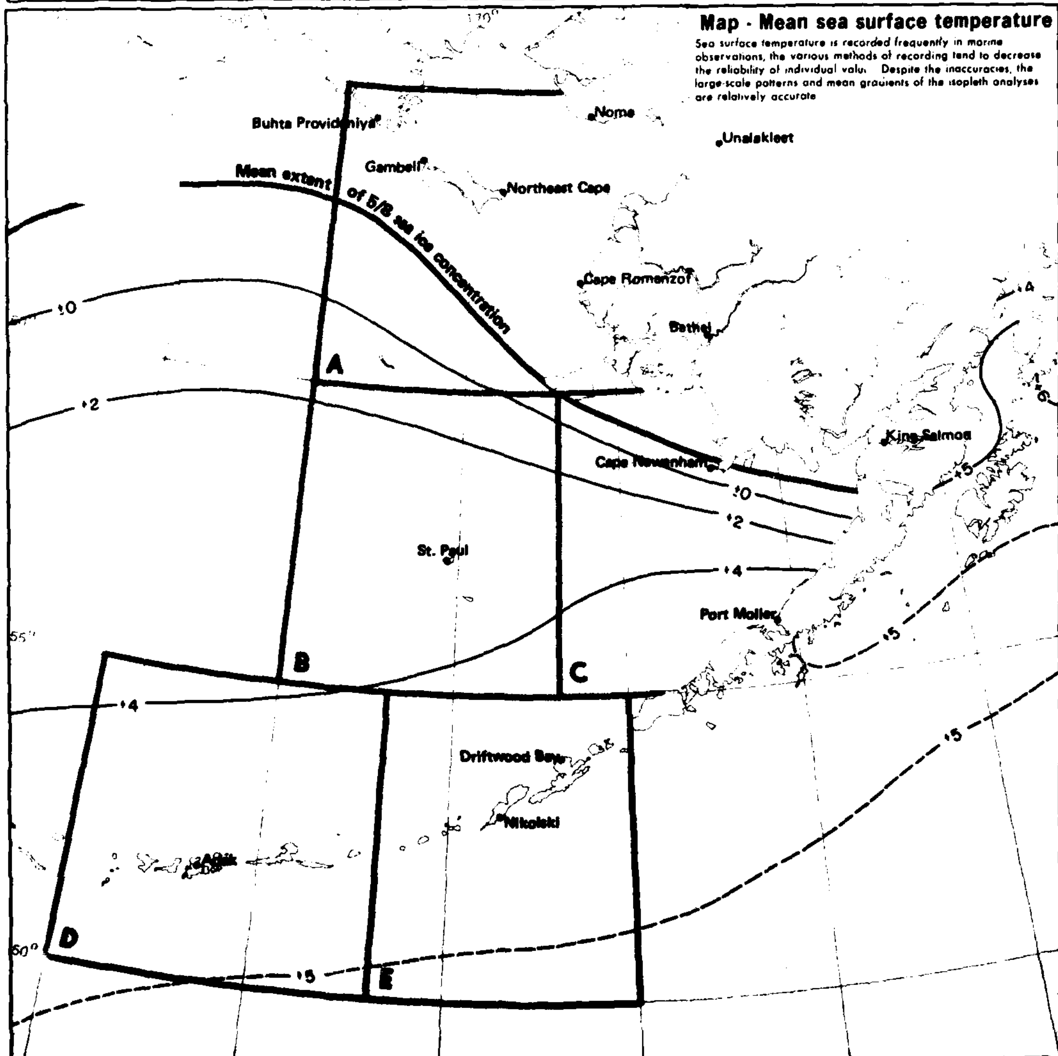


Marine Area B

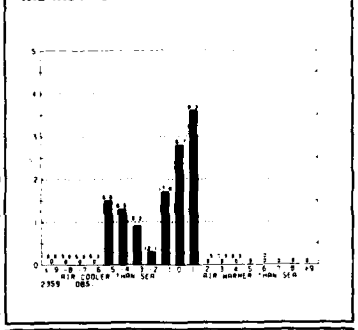


Map - Mean sea surface temperature

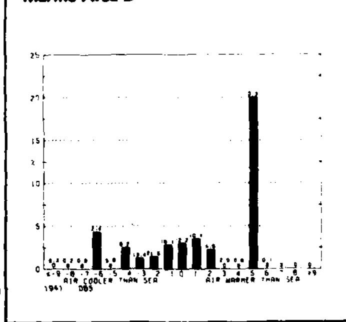
Sea surface temperature is recorded frequently in marine observations, the various methods of recording tend to decrease the reliability of individual values. Despite the inaccuracies, the large-scale patterns and mean gradients of the isopleth analyses are relatively accurate.



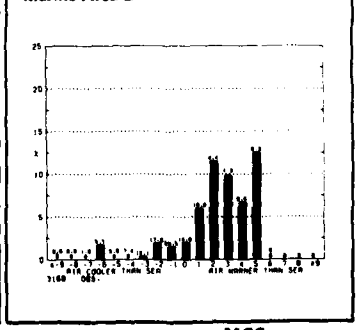
Marine Area C



Marine Area D

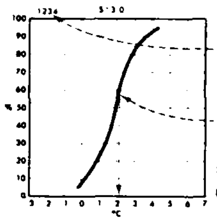


Marine Area E



Legend

Sea surface temperature



Number of observations

Cumulative percent frequency of sea surface temperatures equal to or less than the temperature intersected by the curve

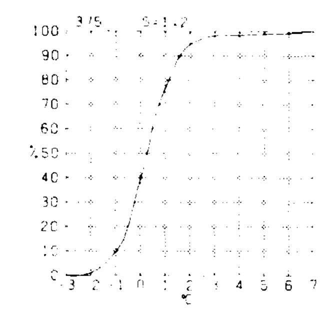
(60% of all observed sea surface temperatures were ≤2.1°C or ≤35.8°F)

S: Standard deviation of sea surface temperatures (°C)

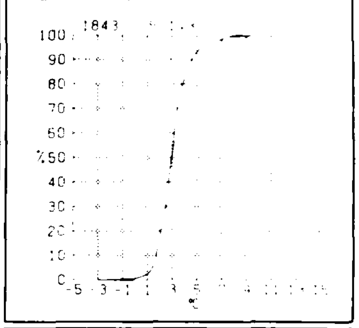
BLACK LINE Maximum (99%) sea surface temperature (°C) (1% of the temperatures were greater than the given value)

BLUE LINE Minimum (1%) sea surface temperature (°C) (1% of the temperatures were equal to or less than the given value)

Marine Area A

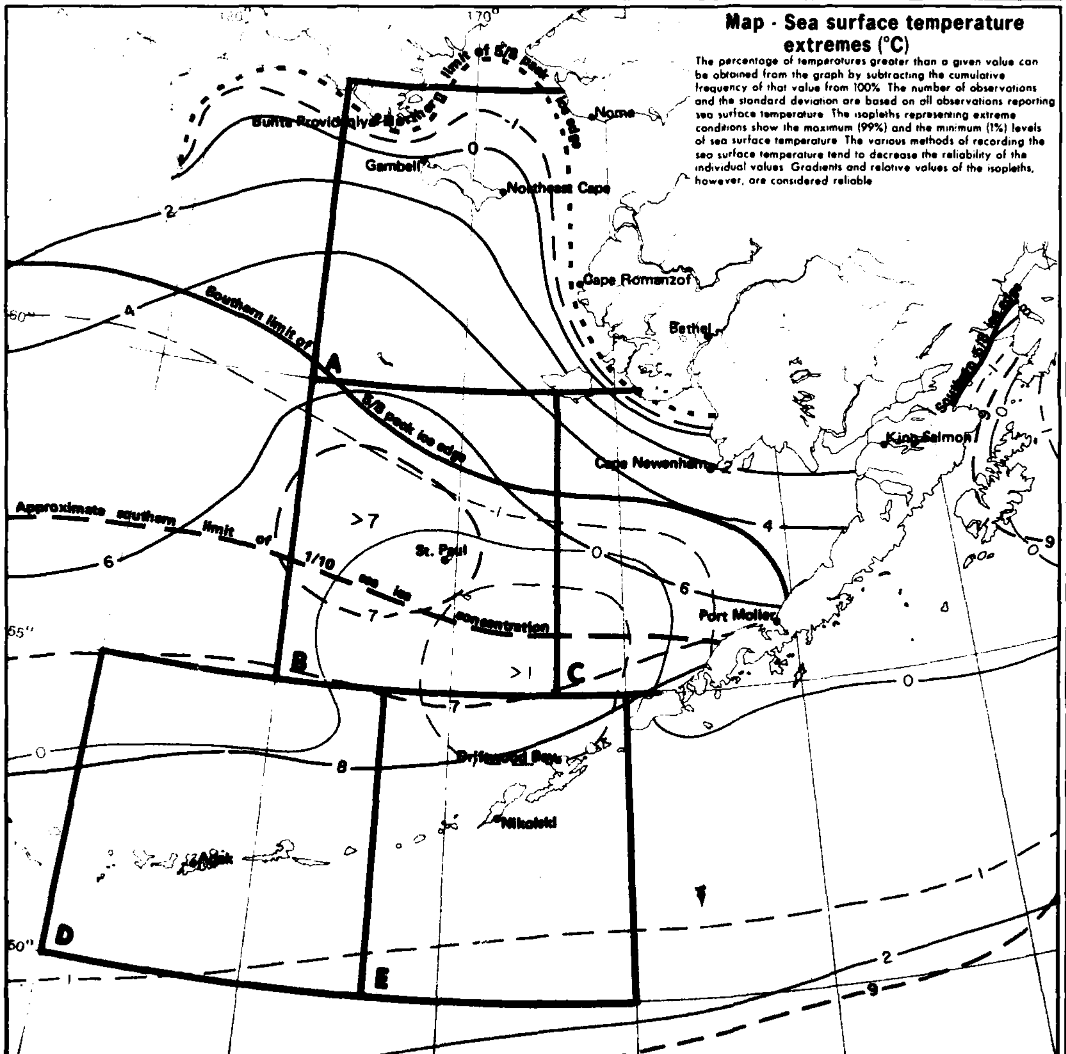


Marine Area B

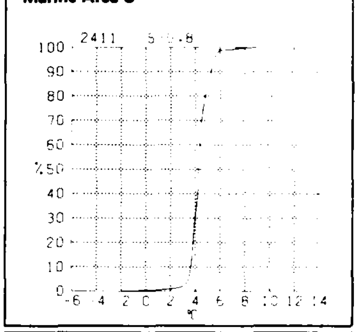


Map - Sea surface temperature extremes (°C)

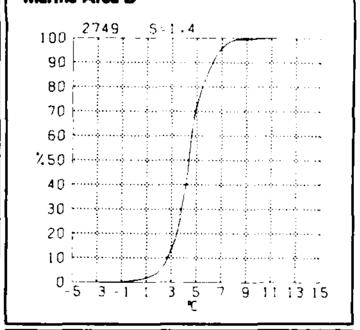
The percentage of temperatures greater than a given value can be obtained from the graph by subtracting the cumulative frequency of that value from 100%. The number of observations and the standard deviation are based on all observations reporting sea surface temperature. The isopleths representing extreme conditions show the maximum (99%) and the minimum (1%) levels of sea surface temperature. The various methods of recording the sea surface temperature tend to decrease the reliability of the individual values. Gradients and relative values of the isopleths, however, are considered reliable.



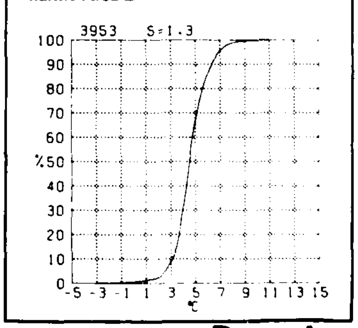
Marine Area C



Marine Area D



Marine Area E



15 Sea surface temperature extremes

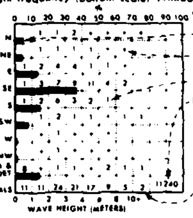
December

Legend

Wave height/direction

Direction frequency (top scale) Bars represent percent frequency of waves from each direction

Height frequency (bottom scale) Printed figures represent percent frequency of wave heights observed from each direction



(5% of all waves were from the N)

indicates < 5% but >0

(1% of all waves were from the S with heights from 6-7.5 meters)

Number of observations

(2% of the waves from all directions had heights ≥10 meters.)

WAVE HEIGHT INTERVAL

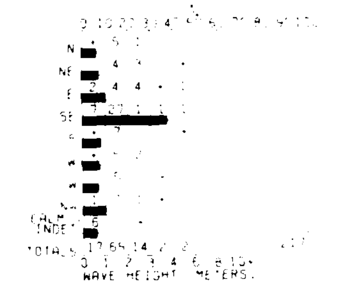
Feet	0-2	3-6	7-9	10-12	13-19	20-25	26-32	≥33
Meters	0-.5	1-1.5	2-2.5	3-3.5	4-5.5	6-7.5	8-9.5	≥10
	0	1	2	3	4	6	8	10+

Printed scale on bottom of chart

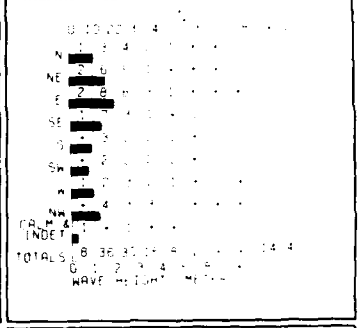
BLACK LINE Percent frequency of wave height <1.5 meters (<5 feet)

BLUE LINE Percent frequency of wave height <2.5 meters (<8 feet)

Marine Area A

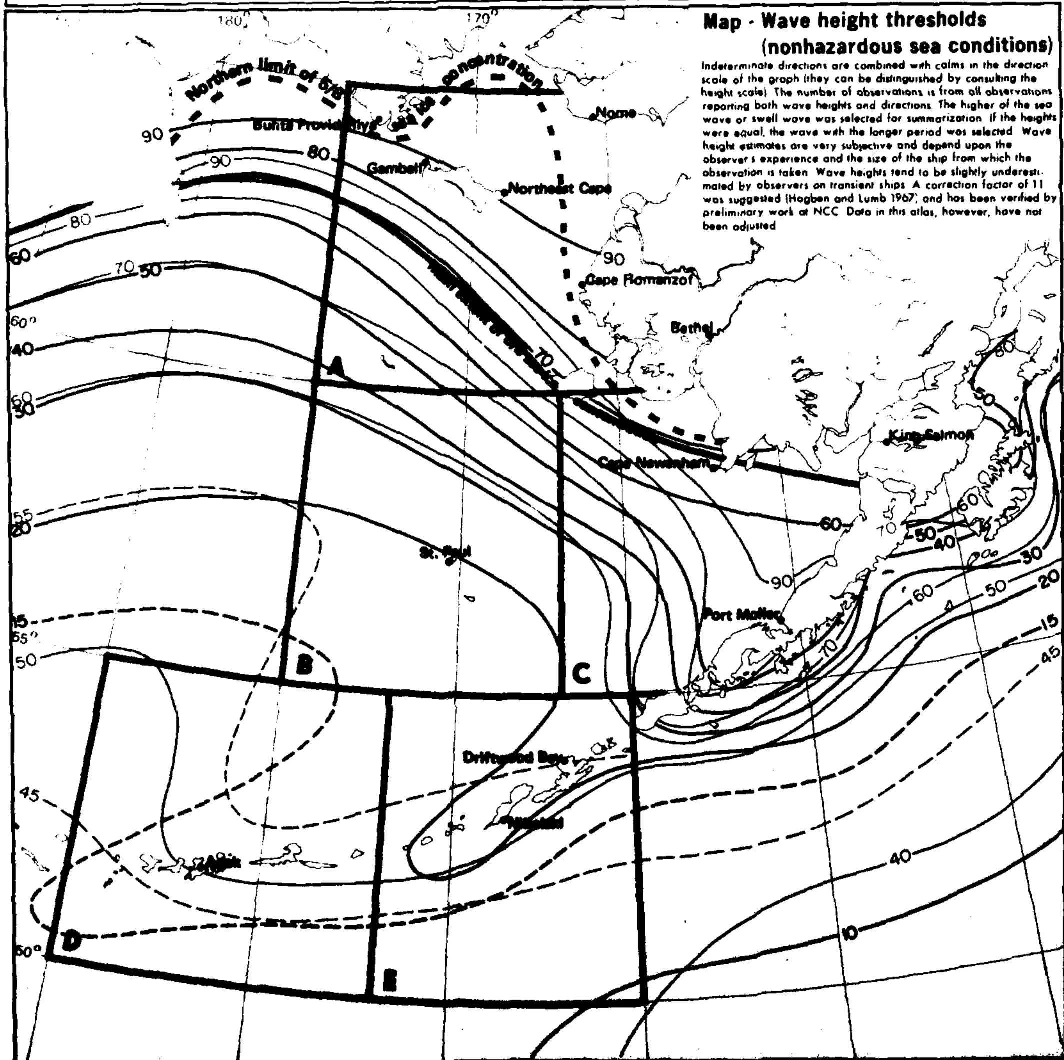


Marine Area B

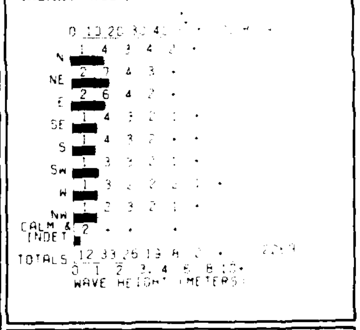


Map - Wave height thresholds (nonhazardous sea conditions)

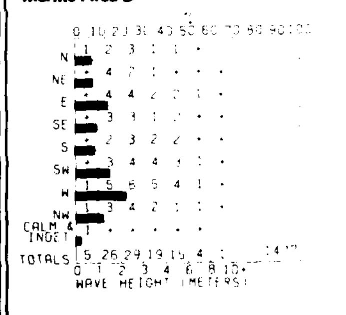
Indeterminate directions are combined with calms in the direction scale of the graph (they can be distinguished by consulting the height scale). The number of observations is from all observations reporting both wave heights and directions. The higher of the sea wave or swell wave was selected for summarization. If the heights were equal, the wave with the longer period was selected. Wave height estimates are very subjective and depend upon the observer's experience and the size of the ship from which the observation is taken. Wave heights tend to be slightly underestimated by observers on transient ships. A correction factor of 1.1 was suggested (Hogben and Lumb 1967), and has been verified by preliminary work at NCC. Data in this atlas, however, have not been adjusted.



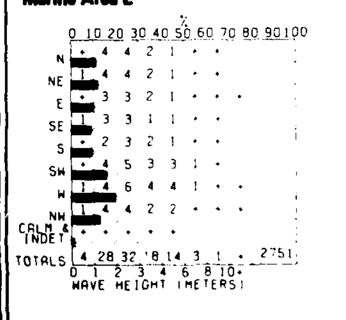
Marine Area C



Marine Area D

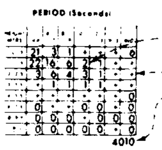


Marine Area E



Legend

Wave height/period



Percent frequency of occurrence of wave period and height

(2% of observed waves had a height of 1-1.5 meters and a period of 10-11 seconds.)

• indicates < 5% but >0

Number of observations

Waves are selected on the basis of the higher of sea and swell when both are reported. If both heights are equal, the wave with the longer period is selected.

BLACK LINE — Percent frequency of wave height ≥3.5 meters (≥12 feet)

BLUE LINE — Percent frequency of wave height ≥6 meters (≥20 feet)

BLUE NUMBER — Maximum observed wave height (meters)

Marine Area A

Marine Area B

Marine Area C

2315

Marine Area D

1491

Marine Area E

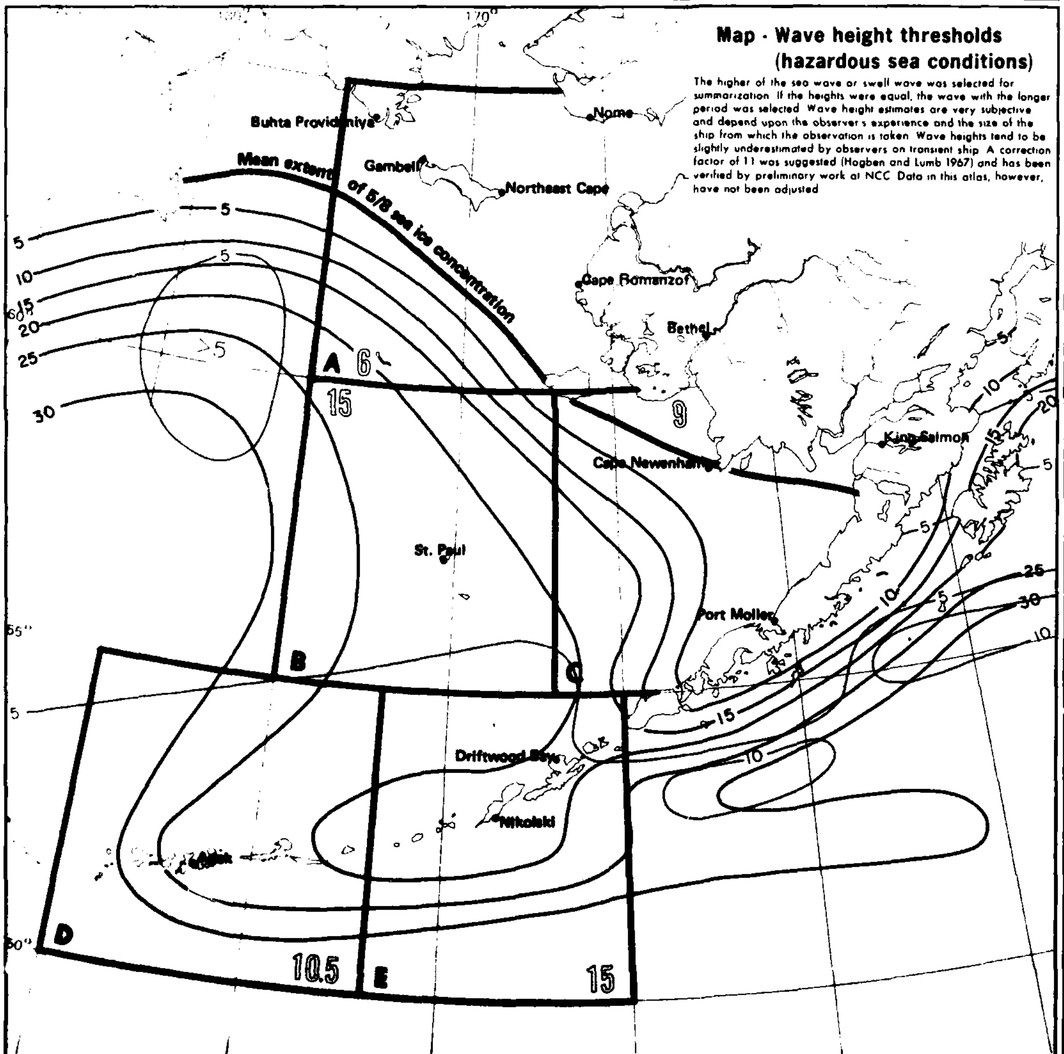
PERIOD (SECONDS)

HEIGHT (MTRS)	<6	6-7	8-9	10-11	12-13	>13	IND
0-.5	4	•	•	•	0	0	1
1-1.5	13	8	5	1	1	•	1
2-2.5	6	11	8	4	1	•	1
3-3.5	2	6	5	2	1	1	1
4-5.5	1	3	5	3	1	1	•
6-7.5	0	1	1	1	•	•	•
8-9.5	0	•	•	•	•	•	•
≥10	0	0	•	•	0	•	0

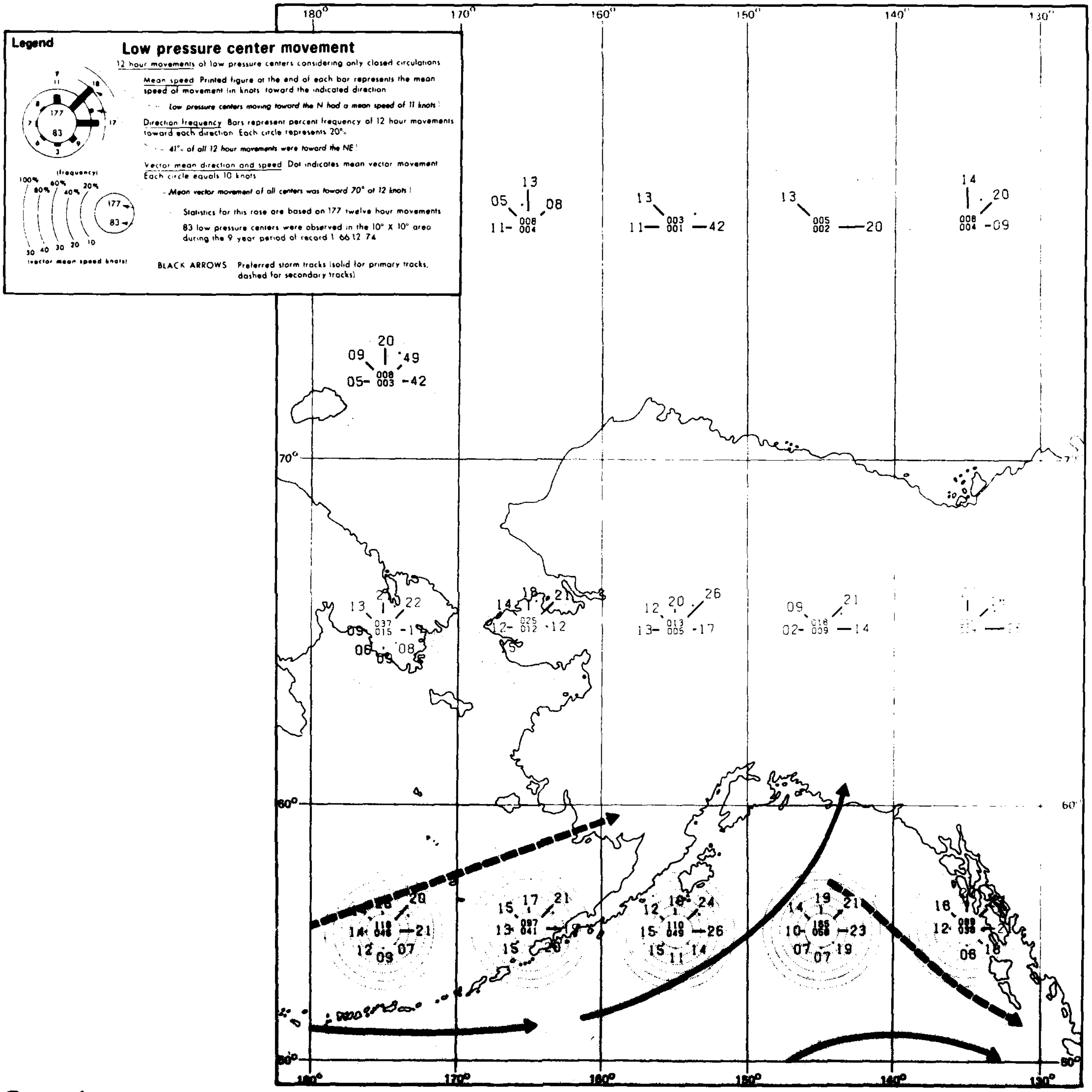
2772

Map · Wave height thresholds (hazardous sea conditions)

The higher of the sea wave or swell wave was selected for summarization. If the heights were equal, the wave with the longer period was selected. Wave height estimates are very subjective and depend upon the observer's experience and the size of the ship from which the observation is taken. Wave heights tend to be slightly underestimated by observers on transient ship. A correction factor of 1.1 was suggested (Hogben and Lumb 1967) and has been verified by preliminary work at NCC. Data in this atlas, however, have not been adjusted.



17 Wave height thresholds (hazardous) **December**

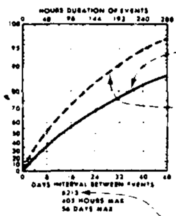


December

18 Low pressure center movement

Legend

Persistence of visibility <2 n. mi.



Hours duration of events · Days interval between events.

Cumulative percent frequency of hours duration equal to or less than the number of hours intersected by the solid curve

(80% of the events had a duration ≤216 hours.)

Cumulative percent frequency of days interval between events equal to or less than the number of days intersected by the broken curve

(88% of the events were followed by another event in 28 days or less.)

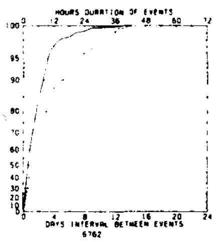
The maximum value(s) of hours duration and/or the days interval will be displayed when the graph limits are exceeded.

Durations and intervals for a particular month extend from the time they begin (or the first of the month if already in progress) and are terminated at the actual ending time, regardless of what month that may be

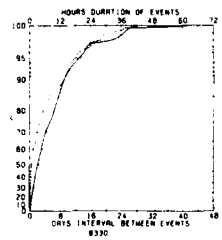
Number of observations

Top and bottom scales are variable to allow for variations in the data.

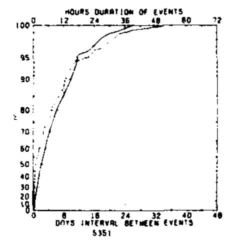
Adak



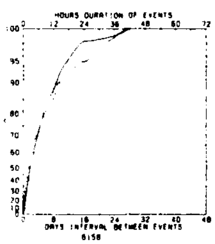
Nome



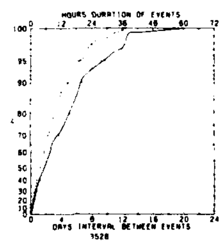
Moses Point



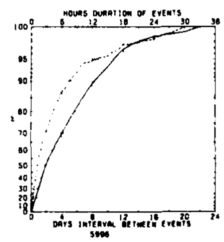
Unalakleet



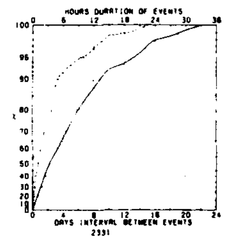
Cape Romanzof



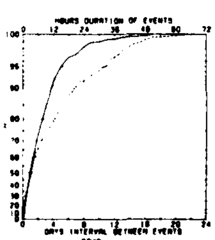
Bethel



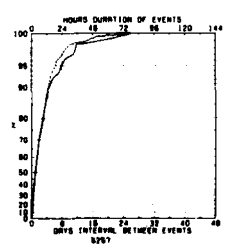
Nikolski



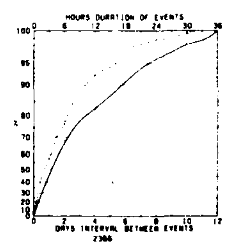
King Salmon



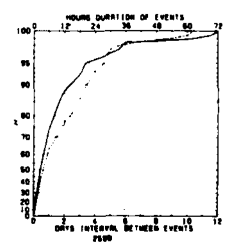
St. Paul



Port Moller



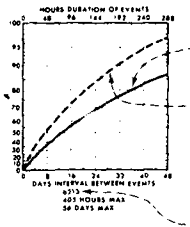
Driftwood Bay



19 Persistence of visibility <2 n. mi. **December**

Legend

Persistence of wind ≥10 kts.



Hours duration of events Days interval between events

Cumulative percent frequency of hours duration equal to or less than the number of hours intersected by the solid curve

(80% of the events had a duration ≤216 hours

Cumulative percent frequency of days interval between events equal to or less than the number of days intersected by the broken curve

(88% of the events were followed by another event in 28 days or less

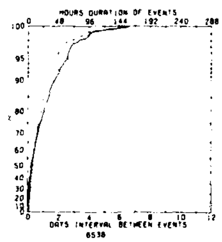
The maximum value(s) of hours duration and or the days interval will be displayed when the graph limits are exceeded

Durations and intervals for a particular month extend from the time they begin (or the first of the month if already in progress) and are terminated at the actual ending time, regardless of what month that may be

Number of observations

Top and bottom scales are variable to allow for variations in the data

Adak



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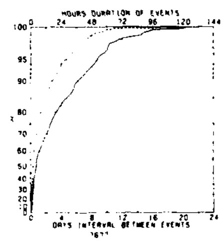

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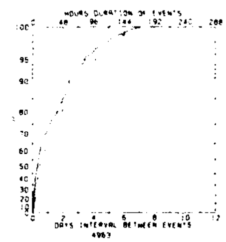

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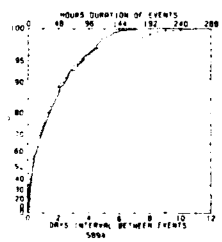

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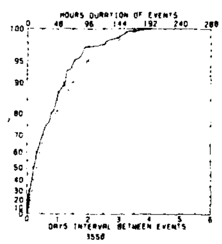

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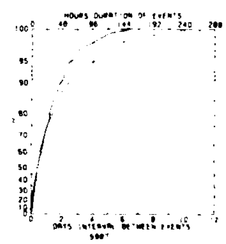

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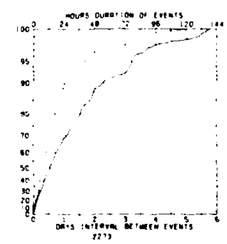

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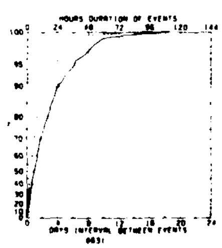

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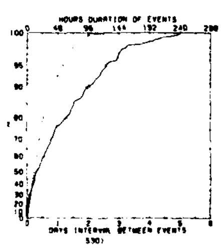

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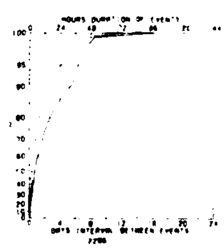

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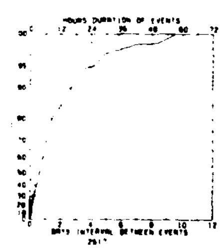
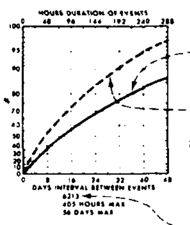


Legend

Persistence of wind ≥20 kts.



Hours duration of events Days interval between events

Cumulative percent frequency of hours duration equal to or less than the number of hours intersected by the solid curve

(80% of the events had a duration ≤216 hours.)

Cumulative percent frequency of days interval between events equal to or less than the number of days intersected by the broken curve

(88% of the events were followed by another event in 28 days or less.)

The maximum value(s) of hours duration and/or the days interval will be displayed when the graph limits are exceeded

Durations and intervals for a particular month extend from the time they begin (or the first of the month if already in progress) and are terminated at the actual ending time, regardless of what month that may be

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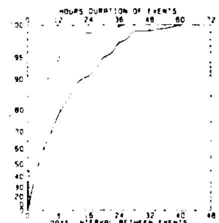
Adak



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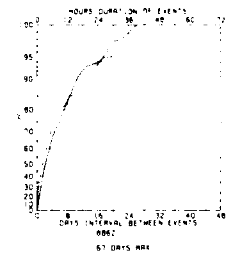

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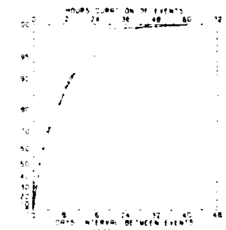

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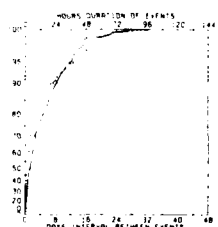

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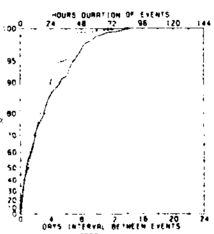

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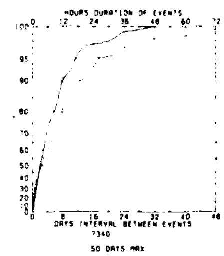

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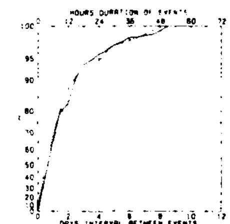
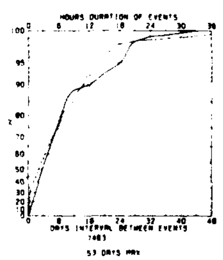


King Salmon



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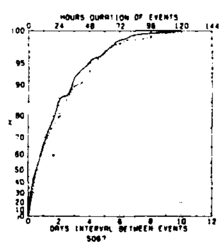

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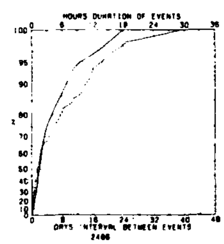

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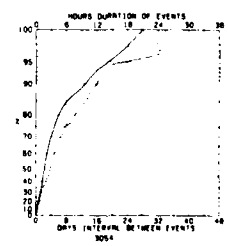


Legend

Annual maximum winds and waves for selected return periods—Marine areas

Return periods for maximum sustained winds and for maximum significant and extreme wave heights are presented in tabular form for selected marine areas. Sustained winds are winds averaged over a period of one minute, the significant wave height is the average height of the highest one third of all waves (sea and swell) in view, and the extreme wave height is an empirical estimate of 1.8 times the significant wave height. Estimates presented in the tables were based primarily on methods described by Thom (see References). For example, on the average the Marine Area A can expect annual maximum sustained wind speed to exceed 110 knots once in 100 years.

Area A

Return period years	Maximum sustained wind-knots	Maximum significant wave-meters (feet)	Extreme wave-meters (feet)
5	78	13.5 (45)	24.5 (81)
10	84	15.5 (51)	28.0 (92)
25	94	18.5 (60)	33.0 (108)
50	102	20.5 (67)	36.0 (121)
100	110	23.0 (76)	42.5 (138)

Area B

Return period years	Maximum sustained wind-knots	Maximum significant wave-meters (feet)	Extreme wave-meters (feet)
5	75	13.5 (44)	24.0 (78)
10	81	15.0 (49)	27.0 (89)
25	91	17.5 (58)	31.5 (104)
50	98	20.0 (65)	35.5 (117)
100	107	22.5 (73)	40.0 (131)

Area C

Return period years	Maximum sustained wind-knots	Maximum significant wave-meters (feet)	Extreme wave-meters (feet)
5	75	13.0 (43)	24.0 (78)
10	81	15.0 (49)	27.0 (89)
25	90	17.5 (58)	31.5 (104)
50	98	20.0 (65)	35.5 (117)
100	106	22.5 (73)	40.0 (131)

Area D

Return period years	Maximum sustained wind-knots	Maximum significant wave-meters (feet)	Extreme wave-meters (feet)
5	74	13.0 (43)	24.0 (78)
10	81	15.0 (49)	27.0 (88)
25	90	17.5 (57)	31.5 (103)
50	98	20.0 (65)	35.5 (116)
100	106	22.5 (73)	40.0 (131)

Area E

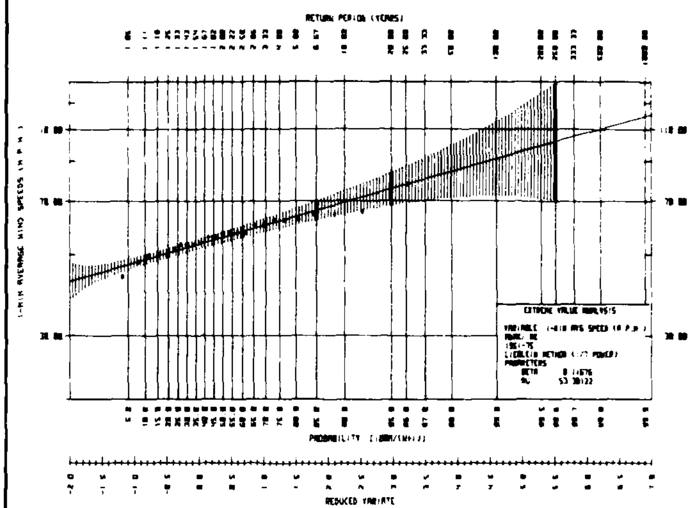
Return period years	Maximum sustained wind-knots	Maximum significant wave-meters (feet)	Extreme wave-meters (feet)
5	74	13.0 (43)	23.5 (77)
10	80	14.5 (48)	26.5 (87)
25	89	17.5 (57)	31.0 (102)
50	97	19.5 (64)	35.0 (115)
100	105	22.0 (72)	39.5 (129)

22 Annual maximum winds and waves for selected return periods—Marine areas

Legend

Annual maximum sustained winds for selected return periods

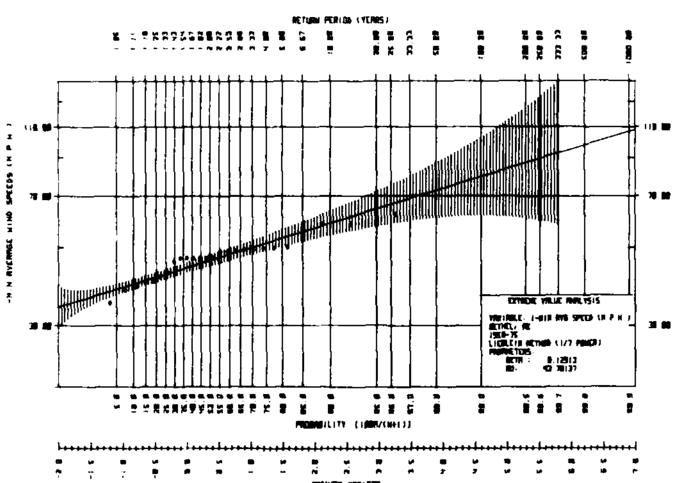
Values of annual maximum sustained wind speeds for selected return periods in years are presented in graphic and tabular form for selected coastal stations. For example, on the average Adak can expect annual maximum sustained wind speed to exceed 82 mph once in 100 years. Stated another way, the probability is 0.99 that the maximum sustained wind will be equal to or less than 82 mph; the probability of exceeding 82 mph in any year is 0.01 (the return period is the reciprocal of the latter probability). This is an estimate of the true 100-year return period value; the probability is 0.68 that the true 100-year value lies in the interval bounded by 68 and 99 mph.



STATION: ADAK, AK — POR 1951-75

RETURN PERIOD—YEARS

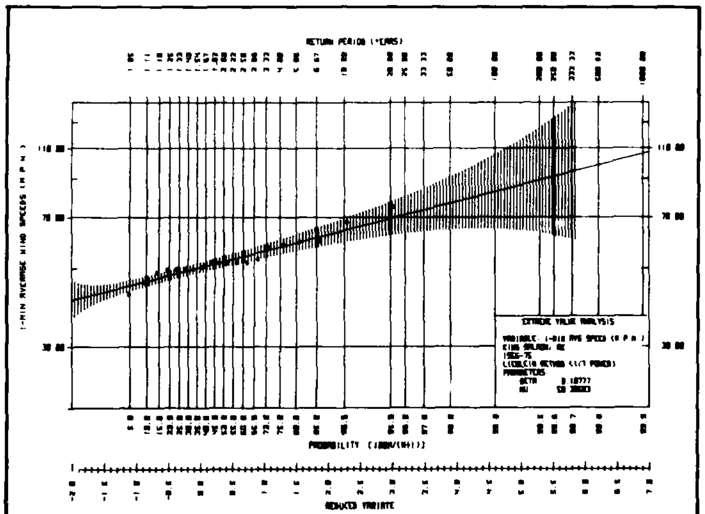
	2	5	10	25	50	100	200	1000
UPPER BOUND (MPH)	57.54	66.91	74.63	87.02	99.15	115.19	137.62	249.85
WIND ESTIMATE (MPH)	55.63	63.50	69.32	77.43	84.06	91.20	98.92	119.39
LOWER BOUND (MPH)	53.79	60.27	64.38	68.90	71.27	72.21	71.10	57.05



STATION: BETHEL, AK — POR: 1950-75

RETURN PERIOD—YEARS

	2	5	10	25	50	100	200	1000
UPPER BOUND (MPH)	47.61	56.24	63.43	75.10	86.67	102.15	124.11	237.92
WIND ESTIMATE (MPH)	45.90	53.14	58.54	66.17	72.46	79.30	86.75	106.82
LOWER BOUND (MPH)	44.26	50.21	54.04	58.30	60.38	61.56	60.64	47.96

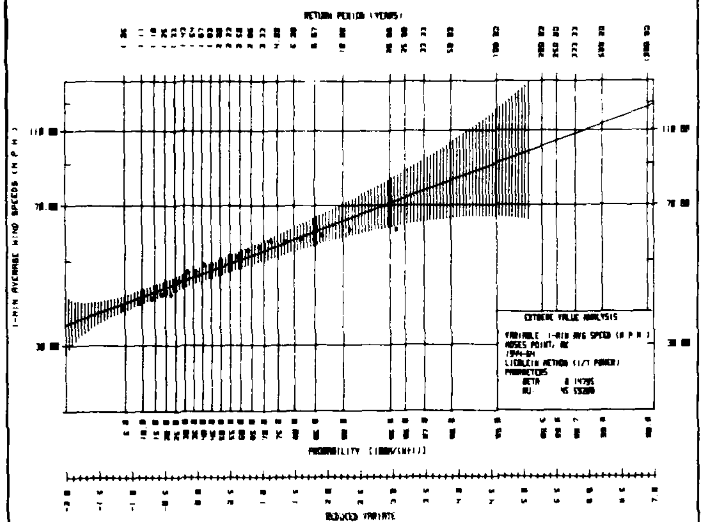


STATION: KING SALMON, AK — POR: 1956-75

RETURN PERIOD—YEARS

	2	5	10	25	50	100	200	1000
UPPER BOUND (MPH)	54.27	62.51	69.30	80.23	90.98	105.26	125.37	227.28
WIND ESTIMATE (MPH)	52.42	59.23	64.21	71.12	76.72	82.72	89.16	106.07
LOWER BOUND (MPH)	50.62	56.11	59.50	63.05	64.70	65.01	63.41	49.59

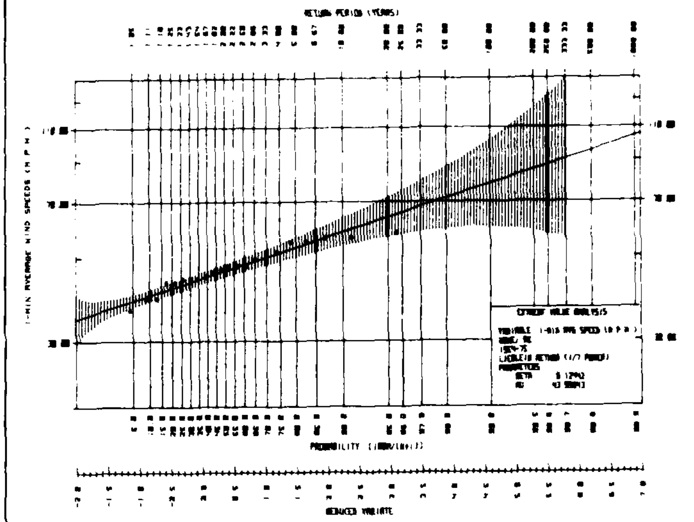
23 Annual maximum sustained winds for selected return periods



STATION: MOSES POINT, AK — POR: 1944-64

RETURN PERIOD—YEARS

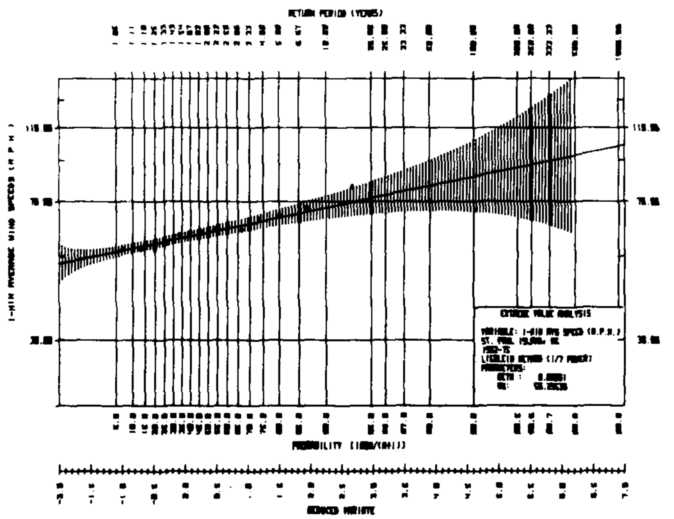
	2	5	10	25	50	100	200	1000
UPPER BOUND (MPH)	50.43	61.19	70.44	86.00	102.04	124.36	137.57	351.63
WIND ESTIMATE (MPH)	48.13	56.92	63.60	73.18	81.21	90.05	99.81	126.68
LOWER BOUND (MPH)	45.94	52.95	57.43	62.27	64.63	65.20	63.22	45.64



STATION: NOME, AK — POR: 1954-75

RETURN PERIOD—YEARS

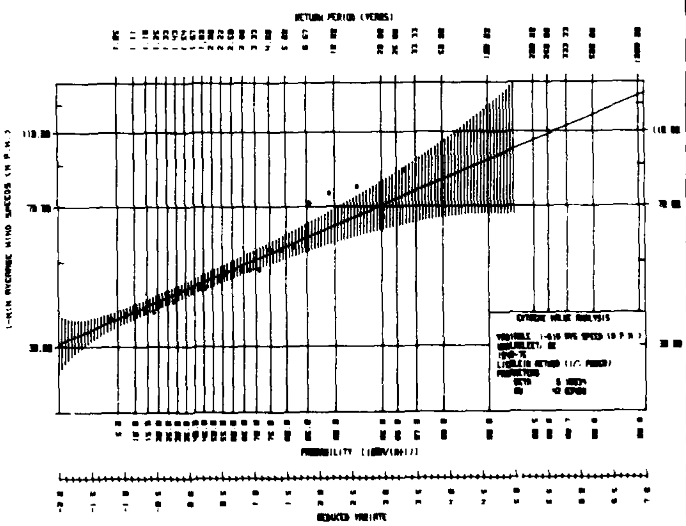
	2	5	10	25	50	100	200	1000
UPPER BOUND (MPH)	47.84	56.26	63.30	74.70	86.23	101.65	123.72	240.37
WIND ESTIMATE (MPH)	46.04	53.02	58.20	65.49	71.48	77.97	85.02	103.89
LOWER BOUND (MPH)	44.31	49.96	53.52	57.36	59.26	59.80	58.42	44.90



STATION: ST. PAUL ISLAND, AK — POR: 1962-75

RETURN PERIOD—YEARS

	2	5	10	25	50	100	200	1000
UPPER BOUND (MPH)	59.81	66.67	72.28	81.14	89.79	101.17	117.09	194.15
WIND ESTIMATE (MPH)	57.98	63.33	67.49	72.85	77.10	81.97	86.27	98.24
LOWER BOUND (MPH)	56.21	60.04	63.08	68.41	66.21	65.76	63.61	49.71



STATION: UNALAKLEET, AK — POR: 1949-75

RETURN PERIOD—YEARS

	2	5	10	25	50	100	200	1000
UPPER BOUND (MPH)	47.52	59.01	68.99	85.89	103.40	127.87	164.40	279.80
WIND ESTIMATE (MPH)	45.35	54.00	62.27	73.05	82.23	92.40	103.97	136.37
LOWER BOUND (MPH)	43.20	51.04	56.20	62.12	65.39	66.89	65.76	40.96

23 Annual maximum sustained winds for selected return periods (cont.)

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